

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
SOUTHERN REGION
701 LOYOLA AVENUE
P. O. BOX 53326
NEW ORLEANS, LOUISIANA 70153

FILE: SECTION

SUBJECT

FOLDER

Eat
Research
Screwworm
General Correspondence

January 11, 1974

Subject: Research Leader for Mission, Texas

To: E. A. Taylor, Director
Subtropical Texas Area
Weslaco, Texas

Attached is an analysis of five highly qualified candidates that were considered for Research Leader of the Screwworm Biology and Control Research at Mission, Texas. I have discussed this with you, Dr. Cox, Dr. Henderson and Dr. McCracken, and we are in agreement that you should offer the position to Dr. J. W. Snow. If Dr. Snow accepts this offer please confirm a date of transfer with him and initiate the necessary personnel documents.

A. W. Cooper

A. W. Cooper
Deputy Administrator

Enclosure

RECEIVED

JAN 14 1974

AREA OFFICE
WESLACO, TEXAS

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FILE 2-1070
[Illegible text]

January 1, 1951

Dear Mr. [Illegible]:

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RECEIVED

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January 10, 1974

Subject: Research Leader for Mission, Texas

To: A. W. Cooper, Deputy Administrator

Following our discussions regarding the need to select a Research Leader to fill the vacancy created by Dr. R. C. Bushland's retirement, I reviewed the MOHR profiles of approximately 200 ARS, APHIS, and FS entomologists. On the basis of those records, I identified a number of good candidates, but five seemed to be the best qualified. Those five individuals are as follows:

Name	Location
Baumhover, A. H.	Oxford, N. C.
Graham, O. H.	Kerrville, Texas
Hightower, B. G.	Mission, Texas
Lofgren, C. S.	Gainesville, Fla.
Snow, J. W.	St. Croix, V.I.

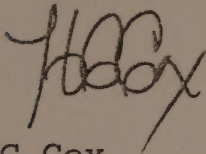
In order to summarize some of the characteristics that are involved in the position at Mission, I developed the attached table. As you will note, each candidate has some strengths that are not possessed by others.

On the basis of training, experience, work habits, and demonstrated research leadership, I recommend that Dr. J. W. Snow be designated as Research Leader. I realize that Dr. Snow has had no previous experience in research on screwworm. However, in view of his good education and training, as well as his outstanding record of experience, he should be able to learn the basic biology in very short order. However, I might point out that Mr. Baumhover spent

2

all of his early career in research on screwworm and shifted over to leadership of research on tobacco insects without any difficulty. As a converse parallel, Dr. Snow directed the tobacco insects research on St. Croix before that program was dropped and the Heliothis was initiated.

If you are interested, I will be glad to discuss my assessment of the relative merits of the five individuals.

A handwritten signature in dark ink, appearing to read 'H C Cox', with a stylized, cursive script.

H C Cox
Associate Deputy Administrator

Enclosure

All of the early work in the field of the history of the United States was done by men who were not only interested in the past but also in the present. They were men who were not only interested in the past but also in the present. They were men who were not only interested in the past but also in the present.

It was the interest in the past that led to the discovery of the history of the United States. It was the interest in the past that led to the discovery of the history of the United States.

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NAME	GRADE	TOTAL	FIELD TESTS		SCREW-	INSECT	DEMONSTRATED	PERFORM.	FOREIGN	AGE	Ph.D
		YEARS	PROF.	LARGE	SMALL		WORM		RESEARCH		
		EXP.			EXP.	ECOLOGY	LEADERSHIP	APPRAISAL	EXP.		
Snow	13	10	+	+	-	+	+++	7-9	-	39	+
Lofgren	15	19	-	+	-	+	++	7-9	+	48	+
Graham	15	30	-	+	+	+	++	5-9	+	56	+
Ba Hoover	14	23	+	+	++	+	+	5-9	+	52	-
Hightower	14	14	-	+	++	+	-	5-7	+	45	+

7

file

An Engineering Evaluation of the USDA
Screwworm Research and Rearing Program

at
Mission, Texas.

by

Henry L. E. Vix, retired

(former chief E&D Laboratory SRRC, ARS, USDA, New Orleans, La.)

A. Sources of Information

1. Visit on January 30, 1974 to ARS Screwworm facilities and discussion with personnel (listed as Appendix (a).)
2. Visit on January 31, 1974 to APHIS Sterile Fly Production Plant and discussion with personnel (listed as Appendix (b).)
3. Review of literature and information available (Appendix (c).)
4. Agenda of Executive Conference ARS Screwworm Research Laboratory, Mission, Texas - January 22-23, 1974
5. Two attachments (Appendix (d).)

B. Syllabus (Statement of Present Status of the Screwworm Eradication Program)

APHIS plant at Mission, Texas began production of sterile screwworm flies in 1962. Production has been increased from 75 million flies to (presently) about 200 million flies per week.

The Southwest eradication program was rather effective over the years until 1972 when there was an outbreak in Texas and other Southwestern states of an unusually high number of cases of screwworm infestations on farm animals (cattle). This problem was not as bad in 1973, but there were many cases in the Southern-most counties of Texas. Adverse weather conditions, during the winter of 72-73 were also factors.

There is some evidence that the current eradication program in the Southwest is not sufficiently effective in keeping the fertile screwworm population from growing and spreading in this country.

Many believe that the sterile male fly produced is not sufficiently competitive to the fertile wild-type male fly. Hence, the 200 million flies per week, broadcast over Southwestern US (and north Mexico) are not providing an adequate and effective barrier.

To support the above opinion recent trappings of egg masses in the field (Texas & Mexico) has shown only 50% of the wild females mated with the sterile male flies even though trappings showed that sterile flies outnumbered wild flies more than 300 to 1. Egg masses laid by wild flies on some

cattle ranged from only 40 to 50 sterile eggs.

In the earlier days beef, than later horse meat, was used as the principal food ingredient for rearing the larvae in the fly plant. Due to availability and price (horsemeat has increased from 15 to 55¢/lb.) the fly production plant at Mission, Texas now uses what is termed a "hydroponic" liquid diet.

The hydroponic diet consists of the following ingredients (on a weight basis):

- 6% sprayed dried blood
- 3% whole powdered eggs
- 2% sprayed dried cheese
- 3% calf starter (milk replacer)
- 0.2% formalin
- The balance water

To seed the individual rearing vats 7.5 gals. of the above mixture is used with 4lbs. cotton linters (2nd cut). The purpose of the linters is to provide a matrix for holding the liquid-slurry like diet. The linters serve a purpose similar to that of the fiber in meat tissue.

Periodically during the rearing of the larvae, part of the spent liquid is removed from the top of the vats by a manual vacuum suction system. Additional "hydroponic liquid diet" is manually added.

Rearing of the larvae on the artificial medium produces flies that are visibly different from those grown in wounds of cattle. The sterile flies are not as large as wild flies and their color is somewhat different. Probably there are other undetected differences.

In the rearing facilities at the Mission plant, the adult larvae is only about 60-65% of the weight of the wild larvae. No doubt such a weight difference results in some adverse physiological defects in the reared sterile flies.

There is some question whether the so called "hydroponic liquid diet" is adequate in comparison to the diet that the wild larvae gets from infesting wounds of warm-blooded farm animals. Many think that better nutritional requirements are needed for adequate larvae growth in the fly production plant.

Another concern is that the feeding system used in the rearing vats become highly contaminated (polluted) with the excrements from the larvae as they developed over the 5-6

day period in the rearing vats. The present vacuum system used to remove the spent liquid is inadequate and leaves behind much of the excrement matter.

Negotiation between USDA groups and those in the Mexican government have been underway for some time for a screwworm eradication program (80% funded by U.S.) in southern Mexico.

In November 1974 a new rearing plant is scheduled for completion at Tuxila Gutierrez, Chiapas, Mexico. This plant is to produce by early 1975 300 million sterile flies per week to compete for mates against the wild screwworm fly population in southern Mexico. If handled correctly and effectively, an adequate barrier should exist in this area. Such a barrier would prevent any fertile wildflies from going northward - and should greatly aid the effectiveness of the barrier provided by the U. S. Southwest eradication program.

Plans have been completed for the Mexican sterile screwworm fly production plant. (I saw them - but did not have an opportunity to study them in detail.) The process is based on the process of APHIS's plant at Mission, Texas. It does have certain modifications. APHIS now has a professional engineer (Mr. Charpentier) on its staff. He was in Mexico at the time of my visit. Hence, I did not have a chance to learn of his specific activities, contributions, or of any specific improvements from an engineering viewpoint in the Mexican plant.

ARS assignment is to support the APHIS screwworm eradication program. The group (principally entomologists) are deeply concerned with the necessary research in areas of genetics, ecological, and physiological consideration for the Southwest eradication program. In addition, currently much attention is being devoted by ARS to screwworm genetics to develop a strain of flies (eggs) that will be useful and effective in the Mexican plant production of sterile flies highly competitive to the wild-type flies in southern Mexico. ARS presently provides no direct engineering input to support the necessary engineering work at the APHIS Mission plant or that needed for the Mexican plant.

The APHIS screwworm eradication program budget for FY 1973 was 9 million dollars. With the Mexican operation included the budget for FY 1974 is approximately 16 million dollars.

An effective eradication program both in Southwest U. S. and in Mexico can prevent annual losses (in both countries) of hundreds of millions of dollars.

C. An Overview of Engineering Input at the APHIS Sterile Screwworm Fly Production Plant - Mission, Texas

Operations 1)	Present Engineering Input 2) %
1. Fly Cage Preparation	40
2. Adult Colony Room	55
3. Overposition Room (Egg Laying & Collection)	50
4. Cold Room - Incineration	60
5. Egg Room	50
6. Hatchery - Incubation	40
7. Larvae Starting Room	40
8. Larvae Feeding and Rearing Room	45
9. Feed Media Preparation Room (Feed Storage)	65
10. Larvae Collection (Larvae walking off section)	55
11. Larvae Collection (Aqueous pump - ejector system)	85
12. Larvae Collection - water separation (screening) concentrating, placement of larvae in trays packed with 10 mesh hardwood sawdust (reused 4 times)	85
13. 1st stage pupation	75
14. Pupae - larvae - sawdust separation	65
15. Collection of larvae for further pupation	60
16. 2nd stage pupation	80
17. Pupation Aging Room	85

18. Cannister Loading	75
19. Irradiation	90
20. Cannister Opening and collection of Irradiated Pupae	80
21. Packaging of pupae in specially designed boxes (about 8x6x5") for use in airplane distribution (to maintain protection barrier and offset infected areas)	85
22. Holding room for packaged pupae	85
23. Shipment of Packaged pupae	80

Support Systems for Sterile Screwworm Fly Production Plant - Mission, Texas

Operations 1)

Present Engineering Input 2)

	<u>%</u>
1. Odor Removal equipment for purging the air (of odor) from larvae collection areas	90
2. Incineration equipment	85
3. Air conditioning system for maintaining temp & humidity requirements for each area (rooms) of process	90+
4. Hot Rooms for Sterilization	80
5. Spent medium (liquid treatment)	75
6. Spent medium (sludge treatment)	75

1.) Conditions - (time - temperature - humidity and light) - for each operation are controlled to approximate those found for optimum wildlife conditions.

2.) This % (engineering input) is based on an estimate made by me (Henry L. E. Vix) from observations of automation vs. manual input and overall continuous vs. batch operations. One must remember that certain operations such as those involved in maintaining the fly colony would be very difficult and perhaps unnecessary to be made into a fully continuous-

automatic operation.

D. Conclusions

1. In view of the current situation and problems (cited in the foregoing section - Syllabus of this report) confronting the U.S. southwest and the proposed Mexican screwworm programs, it is of immediate importance that necessary input of disciplines (including engineering) be made adequate to render the needed support for entomologists engaged in ARS research and in APHIS sterile screwworm fly productions.

2. For the current fly production program at Mission, Texas, APHIS has excellent Methods Development and Maintenance Departments. Over the years (1962-74) APHIS has the services of Mr. Chester Husman for various engineering inputs. Last year APHIS placed a full-time professional engineer (Mr. Charpentier) on its staff. Since he was in Mexico at the time of my visit, I did not learn directly of his contributions or activities.

ARS present support research efforts are directed principally along genetic, ecological, and physiological considerations. Entomologist service these functions. Inclusion of engineering concepts (principally chemical), should greatly benefit the overall support research program of ARS to APHIS.

3. Three approaches for engineering support by ARS should be considered.

(a) Employment by ARS of an experienced chemical engineer. One who has excellent qualifications in professional training and some direct experience in bio-engineering and food engineering. One who exhibits empathy for contributions of other professional disciplines, principally entomology. One who can get-up and go with input that results in improvements for quality and yield benefits and cost reduction in the various operations of the overall process. Placement of an "average" chemical engineer would not prove to be a good investment

(b) Select same phase (or operation) of the process (such as the larvae rearing and collection operations that could benefit greatly by engineering input) and negotiate a research engineering contract with some appropriate university, research foundation, or industrial organization. Such a contract would cover necessary engineering research to greatly improve these operations and yield larvae that produces larger and more competitive sterile flies.

(c) Organize a small group (about 12) of outstanding professional engineering from universities, experiment

stations and industry to meet (about 3-4 days) with key personnel of APHIS & ARS of Mission, Texas to inspect facilities of both, make an indepth visit of the rearing processes to yield sterile competitive screwworm flies and to make conclusions and recommendations for necessary improvements.

It would be beneficial to include engineers who collectively are widely experienced in chemical, food and feed nutrition, sanitation, environmental, mechanical and electrical engineering. Provide members of the group with necessary advance information, such as pertinent literature and summary information on the eradication program (in U.S. and proposed for Mexico) and with necessary process information on the sterile screwworm fly production plants at Mission, Texas and the one-hundred for Mexico.

Advance information on the processes (both at Mission, Texas and that proposed for southern Mexico should include: complete flow diagrams (with all conditions (time, temperature and humidity, etc.) of each operation; material balances showing input and output for each operation; energy balances (heat, light, electricity and labor inputs for each operation); pertinent plant cost information and operating cost for each operation and the entire process; and engineering information on the support system, (such as air conditioning system for removing foul air from larvae rearing room, incineration system, sterilization holding rooms, and systems for treatment and disposal of spend liquids and solids from larvae rearing operations.)

4. The third approach (if organized correctly) should quickly make available a consensus of engineering recommendations and conclusions and also give APHIS and ARS a worthwhile opinion whether their present efforts are in the right direction. One must remember though the plant at Mission needs some changes to produce a more competitive sterile fly and also that based essentially on the Mission process another plant will soon be in operation in Southern Mexico. Time is of essence, and hence, necessary changes (in engineering) should be quickly realized.

5. Engineering input (in order of importance) should be directed to:

(a) Improving the quality of the sterile screwworm fly produced (larger, more rigorous, and more competitive to the fertile wild-type fly).

(b) Quantity of production (from egg to adult fly). Present yields are about 60-70 %.

(c) Security and sanitation in overall process.

(d) Operating efficiency and cost reduction.

6. There is evidence of much good engineering input over the years at the APHIS Mission plant for production of sterile screwworm flies. Some ingenious engineering innovations have been developed and are in use, such as the aqueous flow-screening system used to collect the larvae and concentrate them in the sawdust medium for pupation.

One must remember that the rearing process takes about 12-13 days from egg to the packaging of sterilized pupae (about 95% of the pupae produced) and about 20 days from egg to laying of eggs by adult flies (in the fly colony (from about 5% of the pupae reared)). To carry out these overall processes there are many operations (see list included in this report - Section C) and each require hours to days under optimized conditions of light, temperature and humidity. Many of these operations are batch, or semi-continuous and require much manual input (each shift 100 people; 300 daily). Wherever possible, mechanical means such as monorail systems convey cages, trays, and vats in the "flow" of the process. However, there exist possibilities to further mechanize the process to maintain more continuous and efficient operations.

7. There is evidence of vigilant and vigorous security both at ARS research facilities and APHIS Sterile Screwworm Fly Production Plant. Such security prevents release on any fertile eggs, larvae, pupae or flies. Such security has required many excellent "engineered" precautions.

8. In my quick inspection of the process of Mission, Texas and its various operations, the operations where some chemical engineering input is most urgently needed is the larvae rearing and collection operations. These operations together are the ones needing input to produce a better quality larvae (for a more competitive fly) and in addition are probably the most costly from all inputs (materials, feed, labor and energy).

Specifically (a) the present larvae is only about 65% of the weight of the wild larvae (yielding the fertile wild-type fly).

(b) Yield of flies from egg to larvae to adult fly is only 65%.

(c) "Hydroponic" feeding diet is not

as good nutritionally as that provided by an essentially all-meat (horsemeat) diet.

(d) During the growing of the larvae the rearing vats become polluted with the excrement (metabolic products) of the larvae, and such undesirable matter is not removed adequately, completely and efficiently as spent material from the rearing vats. (A vacuum system is used intermittently and manually to remove surface spent liquid. It does a poor job.

(e) Use of linters as a matrix for the "hydroponic feed" needs engineering analysis. Since linters are hydrophilic fibers, they hold up much liquid. The use of hydrophobic fibers (glass, nylon, polyester, poly-turf, etc.) should be considered.

9. Consideration should be given to other means though the present rearing vat systems such as a continuous belt system of hydrophobic fibers composition. One that includes adequate provision with necessary automatic mechanism to remove adequately and quickly spent liquid and excrement matter and to intermittently provide fresh liquid type feed (of adequate nutrition). One that can be adequately cleared and sterilized, on its underside, for reuse.

10. A centrifugal system for removal of solids from spent liquid, and reuse of the "treated" liquid in feeding operation should be studied. This could greatly minimize disposal problems.

11. There is need of a better understanding of the feeding habits of the larvae. This should be made available to better engineer an effective and continuous larvae rearing operation. Questions - Is it necessary as the adult larva develops for it to bury itself, head down, in the feed bed? Does the larvae "chew" solid like material or "sucks" liquid like material; or does it both "chew" and "sucks"? Do larvae consume any of the "linters" in the present feeding system? or do the linters interfere with their feeding habits?

12. A disposal problem exists in handling the sterilized spent liquid and the "cooked" spent sludge from the rearing vats. Question could not some engineering input be made to render, particularly the "cooked sludge" material useful as an "organic" fertilizer? Probably it is too rich, but it could be diluted with inert ingredients.

13. Although the larvae collection system is an ingenious one - does water have any adverse effect physiologically

on the overall "robustness" and vigor of the larvae and resulting fly? Are some of the larvae "weakened" by such a system particularly during the "purifying" stage where the larvae are completely immersed in water? It is recognized that the larvae do not go through a pump but are moved vertically through the injection system. Other engineering possibilities could be used for preventing the larvae from being totally immersed in water for any length of time.

14. Only about 5% of the pupae is used for maintaining a fly colony for egg production. Consideration should be given to developing such pupae by using the best diet possible (meat diet). Use a continuous system that quickly removes any excrement. Objective is to produce the best quality eggs for producing sterilized pupae.

15. Another approach would be used to grade the pupae and used the best fraction for maintaining the fly colony. Engineering means such as to provide selection on basis of density, size and as well as color could be employed. As far as color - Electronic Sorting Machines such as used in the peanut and coffee industries should be studied for possible means of working the desired separation.

16. Some engineering improvements could be made in such operations as: collection of larvae and placement in trays filled with saw dust for pupation; and separation of pupae from larvae.

17. From an engineering viewpoint, consideration should be given to OSHA, EPA and labor union requirements. There are possible other engineering improvements that could be made after more in depth engineering analyses have been made.

18. This idea is not an engineering improvement, but consideration should be given to it. Study the possible use of GLC, "sniffing" techniques to determine whether there are differences in the "attractants" between wild fertile male and female flies and those being emitted by the sterile "reared" flies. This could make available some important and useful information.

19. Nitrogen and protein compositional analyses of the original feed, of the spent liquid, of the spent sludge, and of excrement matter should be made available. Such information is needed to study effective engineering means for removal of excrement contaminants in the larvae rearing operations.

E. APPENDIX

(a) Discussions were held with following ARS personnel:

Subtropical Texas Area, ARS, Weslaco, Texas

Mr. E. A. Taylor, Area Director

Dr. William Schwiesow, Asst. Director

ARS Screwworm Research, Mission, Texas

Dr. O. H. Graham, Acting Research Leader

Dr. M. M. Crystal, Entomologist

Dr. B. G. Hightower, Entomologist

Mr. C. M. Jones, Entomologist

B. D. Handke - Bio Tech.

J. J. Garcia - Bio Tech.

(b) Discussions were held with the following APHIS personnel at the Sterile Fly Production Plant, Mission, Texas:

Mr. J. Smitty - Manager

Mr. P. Nichols - Asst. Manager

Dr. A. G. Graham, Staff Entomologist

Dr. E. C. Corrison, Entomologist, Methods & Development

Mr. L. Tabor, Maintenance Foreman

(c) Literature and Information

1. Flow diagram and memograph description of Sterile Screwworm Fly Production Plant, Mission, Texas

2. ARS 91-64, Sept 67 - Facts about the Screwworm Barrier Program.

3. ARS-91-61-1, Sept. 69 - Questions and answers on keeping screwworms out of the United States.

4. Charles L. Smith, Journal of Economic Entomology - Vol. 53 No. 6, Dec. 1960 - pp. 1110-1116 - Mass Production of Screwworms (*Callitroga hominivorax*) for the Eradication Program in Southeastern States

5. Airdrops say - "Don't Bug Me" - April 15, 1968
issue of FAA Horizons by George Burloge

6. Report of Nutritional Studies on the Screwworm
conducted at the Screwworm Research Laboratory, Mission,
Texas, Oct. 29 - Dec. 12, 1973 by R. F. Moore, Jr., Research
Entomologist, Southeastern Cotton Insects Investigations,
Florence, S. C.

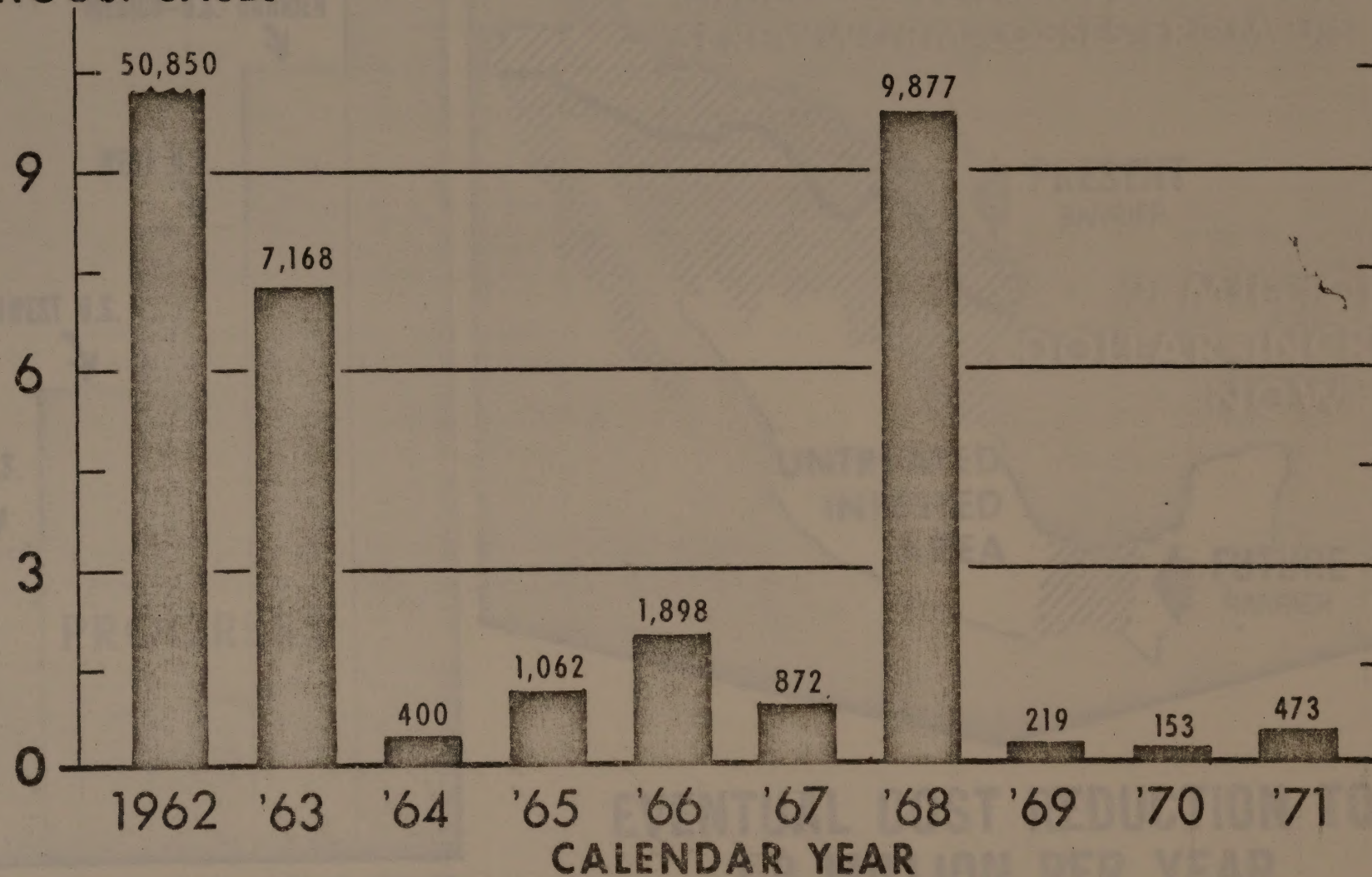
7. Agriculture Yearbook 1952 - entitled "Insects"

8. Agriculture Yearbook 1956 - entitled -
"Animal Diseases"

(d) Two attachments

U.S. SCREWORM INFESTATIONS*

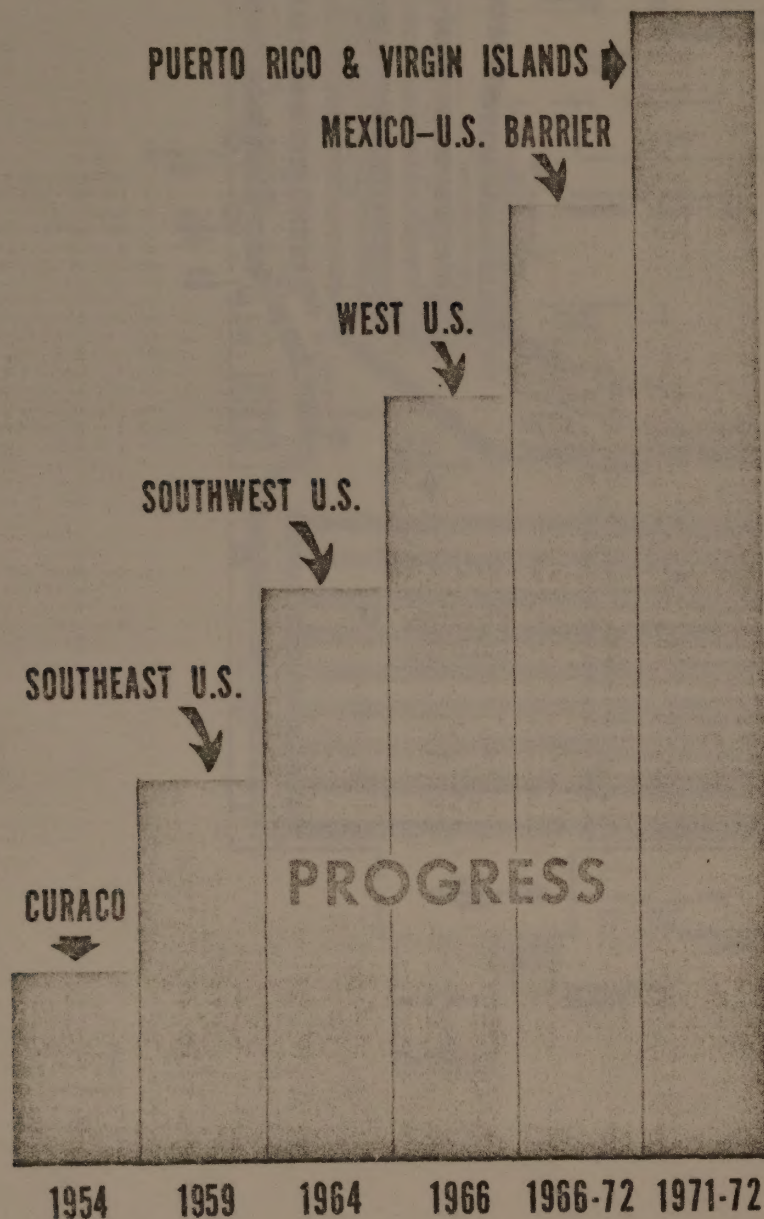
THOUS. CASES



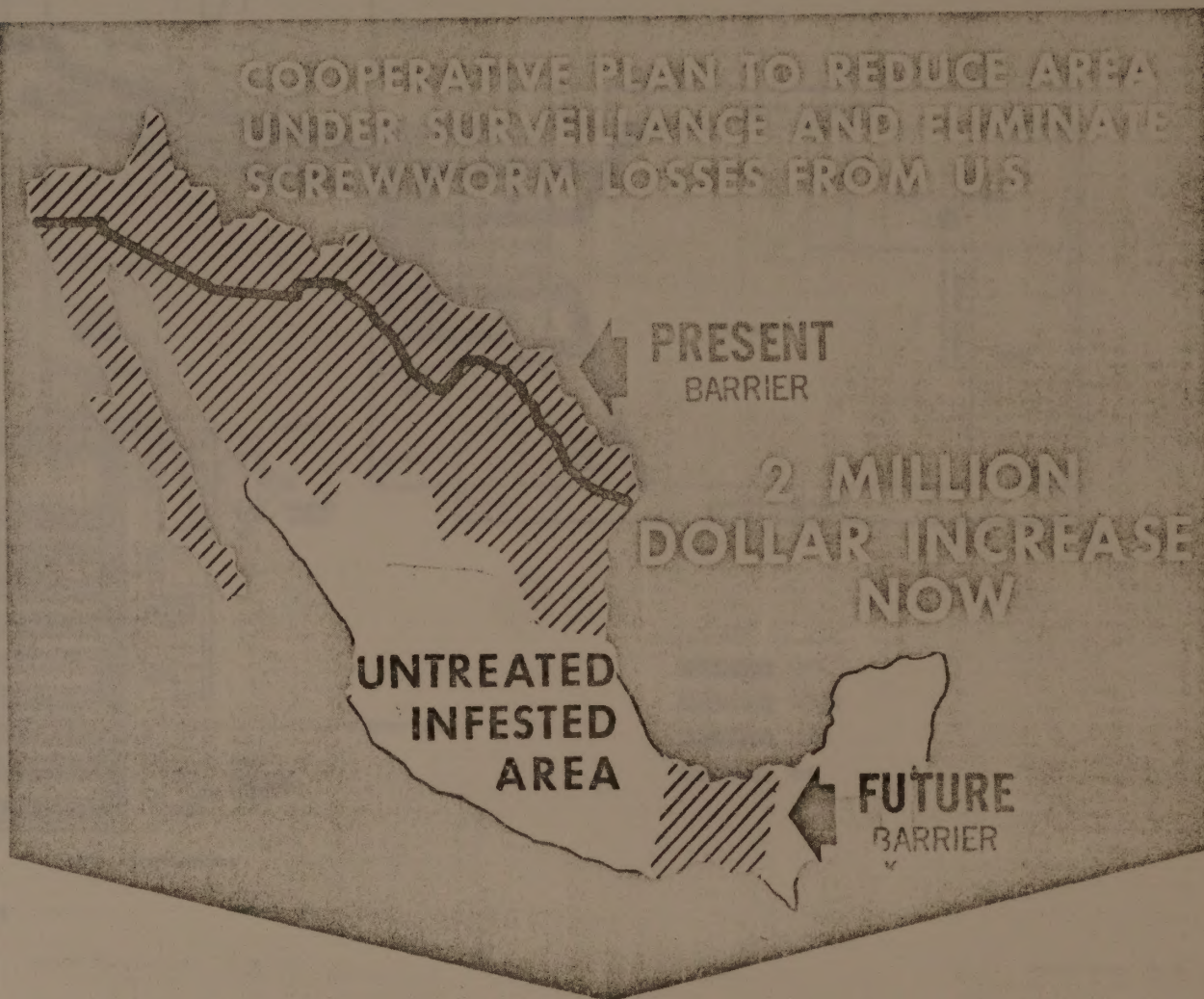
* LABORATORY CONFIRMED.

SCREWWORM ERADICATION:

NEW GOAL: MEXICO



U.S. Department of Agriculture



EVENTUAL COST REDUCTION TO
1.8 MILLION PER YEAR

Veterinary Services

Animal and Plant Health Inspection Service

OPERATIONS MANUAL FOR THE SCREW-WORM FLY RESEARCH PROGRAM

AT THE METABOLISM AND RADIATION RESEARCH LABORATORY,

AGRICULTURAL RESEARCH SERVICE, USDA

FARGO, NORTH DAKOTA 58102

Gerald G. Holt, Research Biologist

Insect Metabolism and Physiology Section

January 8, 1975

The purposes of this manual are (1) to institute operating procedures for the screw-worm research facility at the Metabolism and Radiation Research Laboratory (MRRL), Fargo, ND; (2) to eliminate the potential threat of the screw-worm fly to livestock; (3) to insure safe working conditions for personnel assigned to the project; and (4) to provide information to other members of the laboratory staff, to interested personnel at North Dakota State University (NDSU), Fargo, and to the general public. Where applicable, material has been taken from the security manual of the screw-worm research facility at Mission, Texas.

Based on discussions with Dr. J. T. Schulz, Chairman, Department of Entomology, NDSU, and the state entomologist, a colony of screw-worms will be established after September 15 and destroyed before April 15 of each year with the approval of the state entomologist. According to local meteorological records, weather conditions in the Fargo area during this period will provide a "natural security barrier" for the prevention of escaped insects in establishing an outside population. However, as an added measure of precaution, security measures have been established to prevent viable forms from escaping the laboratory.

Because the screw-worm is an insect of major economic importance and because it is not a native of the northern United States, establishment of a viable colony required the notification of concerned parties and state and federal agencies. The following were contacted and informed of the planned screw-worm fly research program at MRRL: the chairman of the Department of Entomology, the dean of the College of Agriculture, and the associated department heads, NDSU; the state entomologist, the state veterinarian, the officials at the screw-worm laboratory, APHIS, and the area director of the Agricultural Research Service (ARS). Policies and guidelines were set forth by the director of MRRL and the associated research leaders, based on the input of the concerned parties. These policies were incorporated into the security and operating procedures of the Screw-Worm Fly Research Program.

The Facility

The research facility is an isolated, self-contained unit that has been built within an existing greenhouse. All ventilation, heating, and cooling are on independent systems. The facility consists of a complex of two rearing rooms, a main laboratory, toilet, shower, an area for clothing changes, and an office. All rooms are sealed to the outside as well as the outer shell of the greenhouse. Air and exhaust systems and sinks and drains are double-screened. A pass-through box similar to the one in use at the Mission Security Laboratory is located in the wall between the office and the main laboratory area. Doors leading to the facility have locks. Fly paper and fly swatters are available in all rooms to eliminate escaped adults. A freezer with a

locking door is used to destroy insects and to store spent media before incineration. All materials leaving the facility, trash, clothing, etc. are bagged in plastic before removal and appropriate handling. Signs are placed on all appropriate doors informing personnel of an insect security condition.

Security Officer (see attached security-safety form)

A senior staff member from MRRL has been assigned to act as an outside security officer who will periodically inspect and review the operations of the facility. A standard form will be filled out with a report of inspection (both from a safety and a security standpoint) to the laboratory director. A file of reports will be maintained by the security officer, along with corrective measures instituted after a reported deficiency in safety or security.

Scientist in Charge

A staff scientist has been assigned to the Screw-Worm Fly Research Program, and he is responsible for maintaining security procedures set forth in this manual, and he assumes the responsibility of responding to the reports of the security officer.

Entry and Exit Procedures for Authorized Personnel

The outside door of the clothes changing area will remain locked except for entry and exit of assigned personnel. Removal of all street clothing before entering the security areas and the removal of all laboratory clothing and showers before leaving the area will be enforced. It is the responsibility of each individual entering the facility to ascertain that no possible security hazard exists in the dressing rooms, shower, and toilet area. This includes locking doors. Visitors are subject to the same procedures.

Disposal of Spent Media, Viable Forms, and Test Insects

All viable forms of insects will be killed prior to disposal. All viable eggs, larvae, pupae, and adults to be discarded will be stored in a deep-freeze at 20°F or lower for 24 hours prior to incineration. The date and time of each group will be marked on all containers. Spent media will be handled in the same manner. Material for incineration will be transported to the incinerator on Mondays of each work week. The sealed plastic container will be placed into the incinerator and burned in the presence of the worker.

Trash Removal and Laundry Handling

Only containers equipped with plastic inner liners and tight-fitting lids will be used. When the plastic inner liner is removed from the containers, they will be sealed and placed in a freezer set at 20°F or lower for a period of 24 hours. All trash that is stored in the freezer will be dated, labeled, and recorded on a check sheet (enter-exit the freezer). Out-going laundry will be inspected before being bagged in plastic containers. All laundry will be dated and held for 48 hours in cold storage before removal from the facility; it will be recorded on a check sheet (enter-exit the freezer). To insure proper operation of the freezer, a viability test of the insect will be observed after freezing to insure a lethal temperature.

Operating Procedures for Animal Work

In the event that the program requires working with animals, the following procedures will be enforced: Animals will enter the research facility through the rear (south) door AFTER all insects have been confined to the two rearing rooms and AFTER the doors of these two rooms have been closed. Infested animals will be held in metabolism cages throughout the experiment period. Removal of the test animals following experimentation will require that the wound be free of developing larvae and treated with a suitable insecticidal smear, double-checked, and treated with a cotton ball saturated with benzol.

Research on Adult Insects Outside the Security Facility

Since a number of research functions and experiments on adult flies must be conducted outside the rearing and adult holding areas of the security facility, procedures for handling and transportation to the main laboratory area will be instituted. With the weather barrier in mind, adult forms may be used in experiments in authorized areas of the main laboratory only during the period from November to March 15. Precautionary measures for such experiments will be (1) placing the adult insects in sealed containers for irradiation in the radiation facility; (2) placing adult insects in escape-proof cages for all experimentation; and (3) maintaining insects in escape-proof cages for physiological studies that would require dissection and sacrifice of the insects. All research in the main laboratory are will be conducted under closed-door, closed-window, and closed-hood conditions. Any escaped adults will be destroyed immediately. Laboratories or chambers in which viable adult insects are held during experimentation will be locked during nonworking hours.

MRRL PROGRAM OF RESEARCH ON

COCHLIOMYIA HOMINIVORAX



Program of Research on Cochliomyia hominivorax (Coquerel)

at the

Metabolism and Radiation Research Laboratory,

Agricultural Research Service, USDA,

Fargo, North Dakota 58102

Prepared by Gerald G. Holt

January 30, 1975

INTRODUCTION

The subject matter of this report is the ongoing effort and projected integration of research expertise by scientists at MRRL on the screwworm, Cochliomyia hominivorax (Coquerel). Our main thrust is centered around understanding the biochemical, physiological, and behavioral processes associated with the location of a suitable oviposition substrate for the fertile female screwworm fly.

The initial request for MRRL input on the screwworm spans the entire history of the Laboratory. Many of the approaches to insect control on closely related dipteran species, though basic in nature at their conception, now appear to have application. We have been called upon from time to time to answer specific questions by those involved in the project, but until the recent establishment of a colony of screwworms at MRRL, we were limited in our research scope. Since July 1974, the MRRL staff has been actively involved in the establishment of a systematic research approach to the screwworm problem so as to fully utilize the expertise available. An isolated screwworm research facility with security was constructed and equipped by reassigning existing manpower and by using funds and laboratory supplies from existing projects. Since July 1974, contact has been made with a number of people associated (both past and present) with the screwworm program. We have established a working relationship with Dr. Snow's group at the ARS Laboratory at Mission, Texas,

with Dr. H. C. (Chris) Hofmann at the APHIS facility in Mission, with Dr. Cook at the ARS Laboratory in Phoenix, and with a number of scientists at the Gainesville Laboratory.

Following the national meetings of the Entomological Society of America held in Minneapolis in December 1974, a number of ARS scientists from other laboratories visited the Fargo Laboratory. The main topic of discussion was past, present, and future research on the screwworm. During our discussions, it became evident that most proposed and ongoing areas of research would benefit from an interaction of disciplines.

After reviewing the literature on the screwworm published from the mid-1920's to the present, the following may be concluded:

- 1) There were a number of areas in attractants research that appeared promising, but which lacked a systematic approach. Throughout most of the past attractants research, a number of inferences are noted that will have to be resolved before any new program can make progress.

- 2) The support supplied over the past decade to research on the basic biology of the screwworm has been minimal with respect to the importance, magnitude, and impact of the APHIS eradication program.

- 3) There is a need for continued input from "outside" researchers to the ARS Laboratory at Mission, Texas and concerned APHIS personnel.

4) The findings of the Lincoln and Eden report are valid.

Their recommendation to utilize other ARS laboratories that are better suited for specialized research suggests that an effort be made by MRRL personnel.

The following are areas of expertise that we believe can be utilized in a common effort. Perhaps it is not eminently clear just what "level" of research should be initiated to gain information that could be applied to an ongoing insect-control program. Action on the initial request of "developing a bioassay to isolate and identify the chemical factors involved in oviposition" constitutes a major commitment.

RESEARCH TEAM

<u>Research Area</u>	<u>Investigator</u>
Basic Insect Behavior-- Rearing	G. G. Holt, Research Biologist, Insect Metabolism and Physiology
Reproductive Physiology-- Statistical Analysis Systems	T. S. Adams, Research Entomologist Insect Metabolism and Physiology
Reproductive Physiology-- Histochemistry	R. A. Leopold, Research Entomologist Radiation Biology & Insect Genetics
Reproductive Physiology	M. E. Degrugillier, Research Biologist Radiation Biology & Insect Genetics
Animal Physiology & Biochemistry	G. D. Paulson, Research Chemist Animal Metabolism - Agricultural Chemicals
Pheromone Chemistry-- Analytical Instrumentation	J. G. Pomonis, Research Chemist Insect Metabolism and Physiology

Receptor Morphology and
Function

T. K. Borg, Professor, Department
of Zoology, NDSU

Insect Tracking Systems

D. Krause, Associate Professor
Electrical Engineering, NDSU

COLLABORATORS

The following ARS scientists have expertise that can be utilized on the screwworm program at MRRL. They have contributed to the formulation of the research approach at MRRL and are willing to lend their assistance to the contributing investigators:

J. W. Snow and F. Guilliot, ARS, Mission, Texas --

Behavior of insects in native environments

D. Carlson, ARS, Gainesville, Fla. -- Male screwworm mating

stimulant, male housefly sex attractant, trapping,

volatile organic chemicals -- assay systems

H. R. Agee, ARS, Gainesville, Fla. -- Vision of the screwworm

(research in progress)

B. J. Cook, ARS, Phoenix, Ariz. -- Regulation of oviposition,

electrophysiology of chemo-receptors

L. E. LaChance, MRRL -- Radiation biology and insect

genetics

RESEARCH APPROACH

INSECT BEHAVIOR (Holt)

The entire approach to the ovipositional attractants problem is based on the behavioral response of the insect. The behavioral response is determined by the input sensory cues received by the insect and its "physiological" condition. Research will be conducted to determine the measurable behavioral responses in the following areas:

1. Sensory biology

- a) Orientation (attracted - repelled) visual observations to conditions of light spectrum, etc.
- b) Movement (receptor, body parts)
- c) Flight (pattern, direction)
- d) Searching (female activity to oviposition site).
- e) Oviposition (time, mechanics)
- f) Electrical activity of receptors (collaborative with Cook)

2. Design bioassay for --

- a) Wound attractants -- olfactometer -- electroantennogram
(collaborative with Paulson, Cook, Carlson, and Adams)
- b) Pheromone (collaborative with Pomonis, Carlson, and Cook)
- c) Other natural products of females (collaborative with Degrugillier)

3. Analysis of behavior by high-speed microcinematography
 - a) Feeding
 - b) Foreplay (collaborative with Leopold, Degrugillier)
 - c) Flight -- position of tracking device (collaborative with Krause)
 - d) Mating (collaborative with Degrugillier)
 - e) Oviposition (collaborative with Cook)
4. Role of vision in attractants (collaborative with Agee)
5. Role of substrate composition on oviposition (collaborative with Cook)

REPRODUCTIVE PHYSIOLOGY

A number of housefly "model systems" are now available for comparative studies on the screwworm, but the most important points are that physiological indicators can be used in conjunction with behavioral studies and knowing that the physiological conditions surrounding oviposition is imperative. Adams, Leopold and Degrugillier have already begun research on the screwworm and will continue. The pace at which reproductive physiology studies progress depends on other ongoing programs and the time during the year when we are allowed to rear screwworms.

Egg development stages have been employed as precise predictors' of the indicated physiological phenomena in the eye gnat, Hippelates collusor, and the house fly, Musca domestica, on mating (Adams and Mulla 1968, Adams and Hintz 1969), pheromone production (Adams and Mulla 1968), sperm migration and utilization within the female (Adams 1966), time of juvenile hormone release (Adams 1970, Adams et al. 1972), neurosecretory build-up within the brain (Adams et al. 1975, Adams 1975, Adams and Stengel 1975), and fat-body synthesis and utilization (Adams and Nelson 1969). Also, egg stages can be used to determine the physiological age of insects when used with ovariole and uterine dilations and the location of sperm within the female reproductive tract (Adams and Mulla 1967a). Thus, the first phase of screwworm research would be the description of oogenesis.

I. Oogenesis (Adams)

Oogenetic development has been divided into 10 stages for the eye gnat (Adams and Mulla 1967b) and the house fly (Adams 1974). This same stage designation will be used for the screwworm.

- A) Description of stages with quantitation
- B) Effect of different temperatures on oogenetic rate
- C) Determination of optimum temperature for oogenesis
as was done for the eye gnat (Adams and Mulla 1968)
- D) Determination of JH requirement as was done for the
house fly (Adams 1974, Adams and Hintz 1969, Adams and
Eide 1972)

- E) Development of follicles in successive gonotropic cycles as was done in house flies (Adams et al. 1968) and in eye gnats (Adams and Mulla 1967b)
- F) Nutritional requirements for oogenesis
- G) Ovarian condition of field-collected flies from live animals and bait traps

II. Mating (Adams)

Mating has been extensively studied in the house fly and in the eye gnat and a similar approach will be used on the screwworm. Knowledge of the physiological conditions necessary for female mating is a prerequisite for any anticipated pheromone research.

- A) Morphological description as in house flies (Adams et al. 1975)
 - 1) Brain neurosecretory cells
 - 2) Corpus allatum
 - 3) Corpus cardiacum
- B) Evaluate changes in this system during oogenesis as in house flies (Adams et al. 1975, Adams and Stengel 1975, Adams 1975)
- C) Study interactions of the neurosecretory cells, CA, JH, and ovaries with each other as in house flies (Adams 1975)

- D) Condition of neuroendocrine system in field-collected insects from live animals and bait traps

III. Oostatic hormone

The oostatic hormone was first described by Adams et al. (1968) in house flies. It is responsible for regulating ovarian development and JH release (Adams 1970), which is regulated by median neurosecretory cells (Adams et al. 1975). Such a hormone is important because it regulates the release of neurosecretory material and, therefore, has possibilities for insect control. Its presence or absence in the screwworm will be determined.

- A) Determine if extracts of mature ovaries, when injected into immature females, will inhibit egg development as in house flies (Adams et al. 1968, 1970).
- B) Determine if house fly extracts are active in screwworms

IV. Pheromone (Collaborative Role) (Adams)

It has been established that eye gnats produce a sex pheromone, and an olfactometer has been developed for a bioassay procedure (Adams and Mulla 1968). The same procedures will be tried with screwworms.

- A) Olfactometer design

- B) Test live females of specific oogenetic stages for male attractancy
- C) Test extracts of females of specific oogenetic stages for attractancy

V. Mechanisms of mating refusal in female screwworm flies (Leopold, Degrugillier)

Although a successful mating in house flies lasts about 1 hour, sperm transfer is accomplished within the first 10 minutes. The remainder of the time spent in copulo is apparently utilized for the transfer and assimilation of the male accessory sex gland secretion prior to termination of copulations by the female. The concentration of the male secretion in the haemolymph of the female reaches a peak after mating has been completed; whereas the concentration of the secretion within her reproductive tract reaches the highest level approximately 20 minutes earlier. This time lag indicates that assimilation and transport of the mating refusal factor to the target in a sufficient titer to produce a response is a rather lengthy process.

The mating sequence in screwworm flies is completed in less than 4 minutes and, like the house fly, the female repels further copulatory attempts by males. If, indeed, the male accessory secretion produces this response, then the mechanism by which it is initiated may differ from that of the house fly. For example,

there could be several explanations for these apparent differences in mating time: (1) The assimilation of the male secretion could be very rapid with the target organ located in close proximity to the site of deposition; (2) the initial stimulus causing mating refusal could be mechanical (nervous) which is supplanted by a humeral response; and (3) the presence of sperm may be involved. To elucidate the mechanism of mating refusal behavior in screwworm flies, several comparative studies are planned in which screwworms, black blow flies, and house flies will be utilized. (Phormia is included in these studies because it has a mating time roughly intermediate between that of screwworms and house flies). Specifically, the investigations will entail cytological and neurological examination of the reproductive tract of the female screwworm fly and mating studies using glandless castrate males and heterologous implants.

VI. Female accessory gland material as an ovipositional stimulant or attractant (Degrugiller)

Adult house fly females, as well as screwworm females, appear to prefer ovipositional sites that contain eggs from a previous oviposition. In house flies, if more than one egg container is placed in a colony cage, most of the females will oviposit in a single container, generally in one large egg mass. Therefore, a substance on deposited eggs appears to cause other females to utilize this site for oviposition and surrounds at least the anterior end of the

egg, these glands may be a potential source for an attractant substance. Extracts from the large accessory glands of screwworm females will be assayed to determine their effectiveness as an attractant for oviposition.

VII. Effects of female accessory gland secretion of sperm penetrance (Degrugiller)

Current research on the role of female house fly accessory gland secretion on sperm penetrance of the egg indicates that the secretion causes a rupture of the sperm acrosomal membrane, thus allowing sperm to enter the micropyle (glandless females are less than 1% fertile). A study is planned to determine whether a similar mechanism exists in screwworm flies whereby the presence of female accessory secretion is essential for sperm to penetrate the egg successfully.

ANIMAL PHYSIOLOGY AND BIOCHEMISTRY

MRRL has the capabilities to attack the screwworm attractants problem from many fronts. The Animal Science Section has a complete facility for animal husbandry, analytical instrumentation, and has people trained in physiology and biochemistry. By integration of the expertise from the Animal Science project with that of Entomology, the program will have a much broader base.

I. Animal observations and wound biochemistry (Paulson)

- A) Determine animal best suited for laboratory attractants study (rat, rabbit, etc.)
- B) Confirm that female of known "physiological condition" (i.e., mated, mature eggs) is attracted to wound under laboratory conditions (collaborative with Adams, Degrugillier)
- C) Determine if attractiveness is odor, sight, temperature, animal movement, sound, or combination (collaborative with Holt)
- D) Study and compare various wound conditions (age, sterile-infected, infested, egg mass present, etc.)
- E) Determine if larvae or eggs per se attract females to oviposit (collaborative with Degrugillier)
- F) Determine source(s) of attractiveness -- isolate and identify (collaborative with Pomonis and Carlson)
- G) Bioassay of attractants (collaborative with Adams, Degrugillier and Holt)

PHEROMONE WORK

This is ~~one~~ area in which MRRL has not been actively involved and in ^{view} ~~lieu~~ of our overall mission in ARS, we probably should be. The integration of sex-pheromone work into this proposed research was

made for the following reasons:

- A) Gainesville's effort was hindered by not having a colony of insects at this laboratory. Dr. Carlson put considerable effort into the isolation and identification of the screwworm pheromone, but was unable to bioassay for it. He has a continuing interest in this problem.
- B) Having the pheromone will aid in behavioral studies at all levels and areas of research
- C) The pheromone may have immediate field application for Dr. Snow's group.

I. Studies directed toward the isolation and identification of the screwworm "pheromone" (Pomonis)

Although the pheromones from many lepidopterous species and a few from coleopteran species have been identified, the pheromones of dipteran species are unknown except for a very small number. The pheromone of the house fly, which was identified by D. Carlson et al. as (Z)-9-tricosene, ¹⁴⁰an unsaturated hydrocarbon. It has not been established whether hydrocarbons are unique and specific to only muscoids or whether diptera, in general, are attracted to individual hydrocarbons whose structures may vary from species to species.

At this stage in the development of research protocol, there are a number of questions to be asked which are listed as follows:

- A) Is there a sex attractant and/or an aggregation pheromone of the screwworm fly? If there is a pheromone, is it attractive at long distances or only at short distances?
- B) Since the screwworm larva is carnivorous, is the type and production of the pheromone dependent on the diet? It is entirely within reason that because of the diet, the pheromone might belong to a completely different class of compounds than those reported for the entomophagous insects -- e.g., a volatile amine.

II. Approach to the problem

The general approach to the isolation of the pheromone will be based on the assumption that the pheromone is similar to that of the house fly. Therefore, the initial studies will involve chemical operations and manipulations of the traditional approach.

Instrumentation and techniques available are ultraviolet, infrared, proton-magnetic resonance, mass spectrometry (MS), gas chromatography (GC), high-performance liquid chromatography, thin-layer chromatography, gel chromatography, electrophoresis, synthesis, and any combination of the above -- e.g., GS-MS.

RECEPTOR MORPHOLOGY

Enclosed scanning electron microscope photographs of antennae, tarsal pads, and genitalia illustrate the complexity at which the screwworm receives sensory input. Dr. Borg has done a considerable amount of work on this for the project (gratis) and will continue to do so.

I. Receptor Morphology (Borg)

The structures of insect sensory receptors have been investigated in only a few species and most studies involved insects for which fragmentary behavior information on sensory reception exists. It is essential to understand both the internal and external structure of the sensory receptors. External structures of insect sensory receptors are best investigated by scanning electron microscopy (SEM). This technique allows the examination of large surfaces (antennae, genitalia, etc.) on which different types of receptors are located. This technique also provides data on the number of receptors and the general type of receptor -- i.e., mechoreceptors or possible chemoreceptors. Specimens must be coated with heavy metals (gold/palladium) and this coating tends to cover up any pores found on the chemoreceptor-type of receptor. Transmission electron microscopy (TEM) is necessary to define the internal structures and precise determination of the type of sensory receptor. Exposure of the nerve cells via pores

in the cuticle and the number of bipolar neurons innervating the receptors are the type of data produced with TEM.

When this information is known, the precise electrophysiological and behavior experimentation can be undertaken to identify the receptors of specific molecules (pheromones, feeding stimulants, etc.)

In summary, SEM provides a general map of the external structure of the receptors and TEM provides essential internal structures as to how the insect's nervous system is exposed, perceives, and responds to external stimuli.

INSECT TRACKING SYSTEMS

The area of insect tracking would be of great value to any insect program, particularly the screwworm program. The history of MRRL's involvement is based on the premise that someone should keep abreast of new and developing electronic tracking devices that may be applicable to insects. APHIS awarded North Dakota State University a grant in the amount of \$2,000 to conduct a feasibility study on insect tracking. A report is forthcoming in June of this year. The status of the study, at present, is: (1) we have secured a shipment of specialized diodes; (2) they have been successfully attached to the insect (see enclosed photographs); (3) the principle of diode tracking is untested; (4) we are attempting to build a transmitter-receiver from surplus equipment obtained from Government excess

property sources; and (5) other methods of tracking are now being considered -- i.e., sound, optical, etc.

Working beyond June 1975 on this project will be determined by time availability of the primary investigator with respect to other commitments and interests.

SCREWORM FACILITY AT FARGO

TOP LEFT - EXTERNAL VIEW OF CONVERTED GREENHOUSE

TOP RIGHT - INTERIOR VIEW OF SUPER STRUCTURE OF GREENHOUSE

BOTTOM LEFT - SEALED INNER STRUCTURE

BOTTOM RIGHT - "PASS-THROUGH" BOX FROM OUTSIDE OFFICE TO MAIN
LABORATORY



SCREWORM FACILITY

TOP LEFT - ENTRANCE TO FACILITY

TOP RIGHT - CLOTHES-CHANGE AREA

BOTTOM LEFT - SHOWER

BOTTOM RIGHT - LABORATORY CLOTHES-CHANGE AREA, TOILET



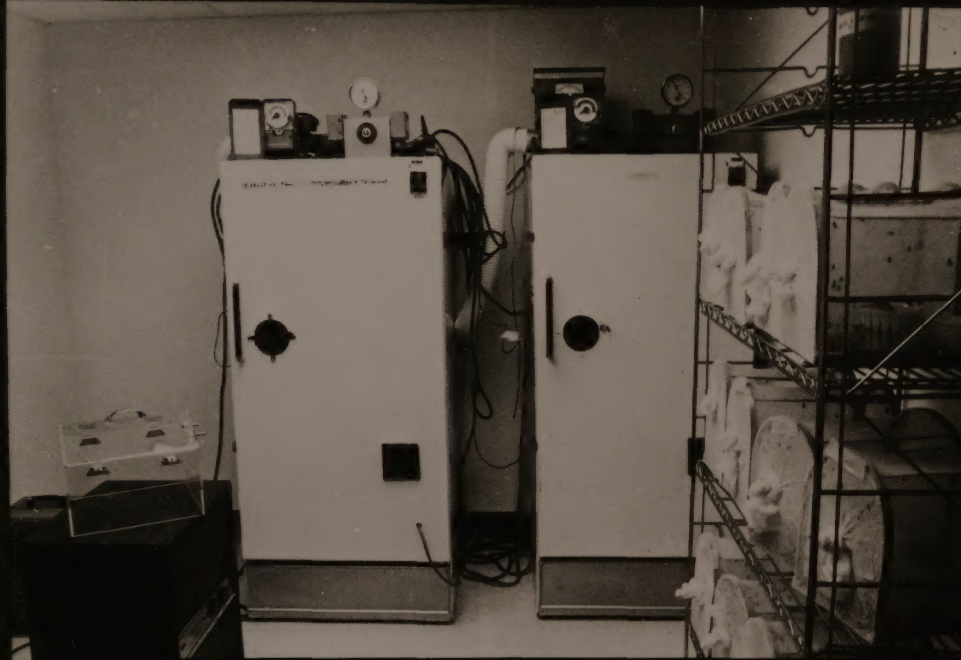
SCREWORM FACILITY

TOP LEFT - REARING ROOM, CHAMBERS, ADULT FLY HOLDING

TOP RIGHT - OFFICE

BOTTOM LEFT - PREPARATION ROOM

BOTTOM RIGHT - ELECTROPHYSIOLOGY AND OLFACTORY LABORATORY



SEM OF SCREWORM FLY

TOP LEFT - TARSAL PAD

TOP RIGHT - ANTENNA

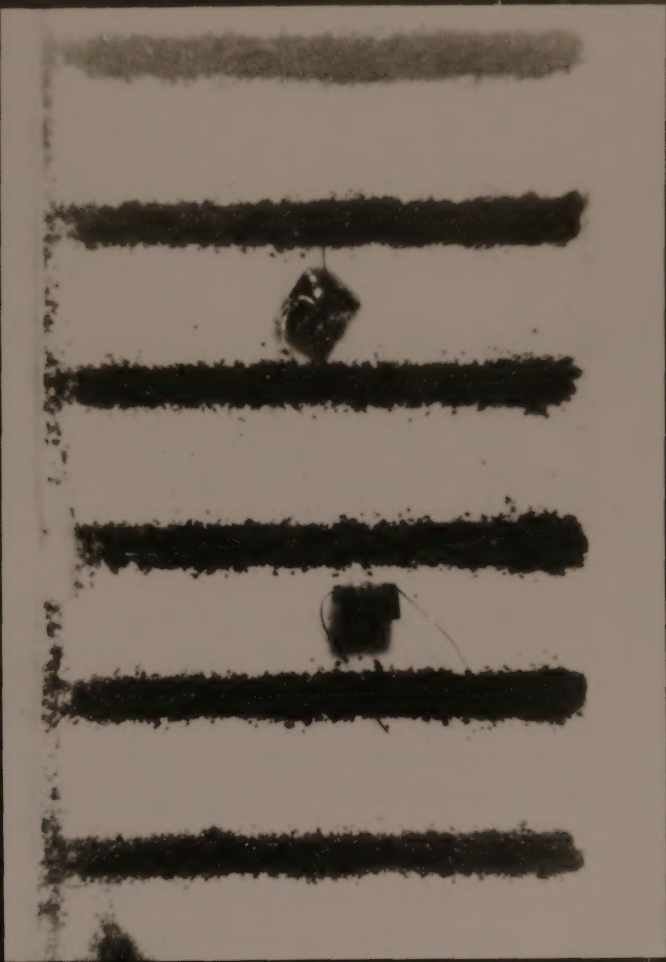
BOTTOM RIGHT - FEMALE GENITALIA

BOTTOM RIGHT - FEMALE GENITALIA



TOP LEFT, BOTTOM RIGHT - DIODE MOUNTED ON FLY

TOP RIGHT, BOTTOM LEFT - DIODE WITH ANTENNA (SIZE 400 MICRONS)
(SQAURE)



PARTIAL LIST OF PUBLICATIONS BY CONTRIBUTING AUTHORS APPLICABLE
TO THE RESEARCH PROGRAM

1. Adams, T. S. 1966. The reproductive biology of Hippelates collusor. Ph.D. Thesis, University of California, Riverside, 130 pp.
2. Adams, T. S., and M. S. Mulla. 1967. The reproductive biology of Hippelates collusor. I. Morphology of the reproductive system with notes on physiological aging. Ann. Entomol. Soc. Amer. 60: 1170-6.
3. Adams, T. S., and M. S. Mulla. 1967. The reproductive biology of Hippelates collusor. II. Gametogenesis. Ann. Entomol. Soc. Amer. 60: 1177-82.
4. Adams, T. S., A. M. Hintz, and J. G. Pomonis. 1968. Oostatic hormone production in house flies, Musca domestica, with developing ovaries. J. Insect Physiol. 14: 983-99.
5. Adams, T. S., and M. S. Mulla. 1968. The reproductive biology of Hippelates collusor. III. Effect of temperature on oogenesis. Ann. Entomol. Soc. Amer. 61: 368-72.
6. Adams, T. S., and M. S. Mulla. 1968. Ovarian development, pheromone production, and mating in the eye gnat, Hippelates collusor. J. Insect Physiol. 14: 627-36.
7. Adams, T. S., and A. M. Hintz. 1969. Relationship of age, ovarian development, and the corpus allatum to mating in the house fly, Musca domestica. J. Insect Physiol. 15: 201-15.
8. Adams, T. S., and D. R. Nelson. 1969. The effect of the corpus allatum and the ovaries on the amount of pupal and adult fat body in the house fly, Musca domestica. J. Insect Physiol. 15: 1729-49.
9. Adams, T. S., 1970. Ovarian regulation of the corpus allatum in the house fly, Musca domestica. J. Insect Physiol. 16: 349-60.
10. Adams, T. S., J. D. Johnson, C. L. Fatland, and G. Olstad. 1970. Preparation of a semipurified extract of the oostatic hormone and its effect on egg maturation in the house fly. Ann. Entomol. Soc. Amer. 63: 1565-9. Proc. N. D. Acad. Sci. 23: 14..
11. Adams, T. S., H. M. Flint, and D. R. Nelson. 1972. Effect of X-irradiated ovaries on corpus allatum size in the house fly, Musca domestica. J. Insect Physiol. 18: 1413-25.

✓ EAT *EAT*
✓ WFS *WFS*
— JE *JE*
— NC

February 5, 1975

Subject: Transmittal of Program of Research on Screwworms
at the MRRL, Fargo

To: Waldemar Klassen, Staff Scientist
National Program Staff, ARS, USDA
BARC-West, North Building
Beltsville, Maryland 20705

I am pleased to transmit the enclosed document, and I am sure that you will agree that Gerald Holt is to be complimented for putting together a well prepared, lucid program of research on the screwworm here at Fargo.

As you know, back in November we requested a new WRU be established to cover the screwworm research at MRRL. At that time we indicated that the work would be initiated by redirecting \$37,920 from lower priority research. The program envisaged in this brochure is much more extensive and will require additional funds if it is to be pursued vigorously. Only some exploratory work can be done with existing funds.

The expertise of our scientists at MRRL is admirably suited for the projected research. Many of the experimental techniques have been perfected on other insects and with only slight modifications can be used to study the biology of the screwworm. You will also note that four other collaborators from other ARS laboratories have expressed a willingness to cooperate with us on some of the research studies. MRRL has provided some input to the screwworm program for over ten years. Now we are in a position to make a major contribution to the biology of this important livestock pest and thus provide substantial information for the APHIS eradication program.

Claude H. Schmidt
Claude H. Schmidt, Director
Dakotas-Alaska Area

Enclosure

cc: A. Cooper
E. Glover
✓ E. Taylor

RECEIVED

FEB 10 1975

AREA OFFICE
WESLACO, TEXAS

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
METABOLISM AND RADIATION RESEARCH LABORATORY
STATE UNIVERSITY STATION
FARGO, NORTH DAKOTA 58102

February 4, 1975

Subject: Program of Research on Cochliomyia hominivorax at the
Metabolism and Radiation Research Laboratory, Fargo, ND

To: Waldemar Klassen, Staff Scientist, Pest Management, NPS,
ARS, USDA, ARC-W, North Bldg., Beltsville, Md. 20705

Through: C. H. Schmidt, Director, Dakotas-Alaska Area *CHS*
Edward J. Thacker, Director, MRRL
L. E. LaChance, Research Leader, Radiation Biology and
Insect Genetics, MRRL
D. R. Nelson, Research Leader, Insect Metabolism and
Physiology, MRRL

Enclosed is the material you requested in our telephone conversation
of January 20.

If you have any questions or suggestions, please call me.

Since our original intentions were to submit a report in May (with
preliminary results), there may be areas that lack continuity or
clarity in this report.

Gerald G. Holt
Research Biologist

Encl.

DRAFT

Rec'd via Teleprinter
8-4-76 11:15 AM
To: Donald Williams, Rm 732
From: HC Cox

QE

Subject: Evaluation of Screwworm Eradication
Data System

To: F. J. Mulhern, Administrator, APHIS

This is in further reference to our earlier correspondence regarding the above subject. Several members of our staffs met on July 31 in order to discuss research required to determine applicability of the NASA Screwworm Eradication Data System (SEDS) to screwworm eradication operations. Participants from APHIS were Drs. Donald Williams (Hyattsville) and Floyd Smith (Mexico City). ARS participants were Drs. Robert Miller (Washington), Wendell Snow (Mission) and H C Cox (New Orleans). It is my understanding that NASA believes its system to be currently operational, has indicated that funding for development will terminate at the end of FY76, and has proposed that APHIS take over the system after FY76.

NASA has been making data from the system available for the past few months. Our scientists have reviewed only a limited amount of data from the system but, on the basis of their preliminary analysis, they have doubts about its applicability to an operational eradication program. Not only have they been unable to correlate screwworm occurrence with predictions from the system, but other factors make it appear that the system has not been completely "de-bugged". These factors range from less important (for example, variations in the color codes of predictions of conditions conducive to screwworm growth) to extremely important (for example, no reports due to long periods of cloud cover in southern Mexico).

We do not feel that ARS scientists will be able to accurately evaluate the predictive capability of SEDS until NASA has the system operationally ready. At that time we believe we should evaluate the system over an entire year, that is four full seasons. We realize that NASA has budgeted their work on SEDS only through this fiscal year. However, if the system is to be seriously considered for operational use it would be unfair to NASA and SEDS to make an evaluation before they are completely satisfied that the system has all the bugs worked out. (Reviewers: is there a better phrase to use here?) Therefore, we would hope that NASA would be encouraged to continue the project through FY77. Specifically this would allow them time to perfect the system and then allow us time to adequately evaluate it.

In the meantime, our Mission laboratory will continue to make preliminary (Reviewers: is there a better word?) evaluations on the predictive capacity of SEDS by using data on known screwworm cases supplied by your Mission facility. While most of the data will probably be from south Texas, we will also consider such data from Mexico as is available from reports made to Hyattsville.

NASA has scheduled a technical review of SEDS and their proposed participation in the joint Mexican-American Program in Houston on August 19-20. Dr. James Novy (APHIS), Drs. Marco Villasenor and Norvan Meyer (Joint Commission), and Drs. Wendell Snow and Robert Miller (ARS) have been invited to attend.

The meeting will undoubtedly include discussion of NASA's Phase II Project Plan, Screwworm Eradication Data System (SEDS) Field Tests. The document proposes field tests in Mexico as a joint effort among NASA, USDA, the Secretaría de Agricultura, SAG, and the Comission Nacional del Espacio Exterior (CONEE). The proposal indicates that SEDS has been operational since mid-March 1975, producing data with sufficient accuracy to be useful in monitoring screwworm growth but that it must be field tested and evaluated before it is used operationally. We will, of course, be glad to work with NASA to the extent possible with current resources in order to assist them in modifying and improving their system over time.

While we have doubts about a simplistic system involving only temperature and moisture, we feel that the concept of a predictive system is good and could be useful to an operational screwworm eradication program. However, such a system should include a number of other variables such as types of vegetation and stages of growth, wild life in the area, ranching operations such as shearing, lambing, dehorning and branding, and so forth. In the event that the evaluation of SEDS indicates that it is not adequate for operational use, we will be interested in learning the extent of your interest in our undertaking research to develop such a system. We would have to consider such a research program within the limits of our current resources; however, we would not want to redirect current research on attractants, biology and ecology, and nutrition and rearing unless you feel such changes would be desirable.

File

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
RADIOLOGICAL SAFETY STAFF
PLANT INDUSTRY STATION
BELTSVILLE, MARYLAND 20705

June 11, 1973

Subject: Calibration Data for Husman Irradiator Serial Number#001

To: M. E. Meadows
USDA, APHIS, VS
P. O. Box 969
Mission, Texas 78572

During the period May 14 through May 26, 1973, the Husman Irradiator, Serial Number 001, was calibrated using the Fricke Chemical Dosimetry System. Enclosed are pertinent summary data and a discussion in reference to establishing an initial irradiation time that will assure sterilization of screwworm pupae.

The Sample Identification Chart shows the positions that dosimetry samples were taken with reference to source locations and the between source areas around circular patterns within the chamber. On Data Sheets 1, 2, 4 and 5 these locations are shown as the column headings. The horizontal line designations on these sheets show the relative position of dosimeters placed lengthwise through the chamber.

Data Sheet #1 shows radiation values of samples placed on a 2" radius from center. The center of each sample is located at the intercept points of the column and line designations. Data Sheet #2 shows some values obtained on a 1" radius from center while Data Sheet #3 shows values obtained on the central axis of the chamber. The source loadings seem to be fairly even. Using 8" active length sources positioned end to end and as close to the ends of the chamber as possible one would expect the low areas to be at the ends and at the center. The high areas would be expected to occur roughly midpoint between the center and the two ends of the chamber. This pattern is obvious from Data Sheet #1 when one observes the values under a particular column heading through the length of the chamber. The readings under columns 2 and 3 which are directly adjacent to sources 2 and 3, are about even. (Readings (2)-1 and (2)-17 are obviously bad ones). The readings under column 1 are considerably lower; however these are readings adjacent to the bottom source which has a 1/16" stainless steel plate (bottom of the irradiation chamber) between the source and the chamber. This thickness of steel will account for the difference found. Note that the lowest readings are found near the edge of the chamber at the midpoints between sources 1 and 2 and 1 and 3. Also note that the front end of the chamber (front corresponds to the front end of the unit) appears to be lower than the rear. The highest readings occur at the chamber edge approximately 5" from the front and rear of the chamber.

Due to problems in chamber construction, the need for space in the end of the cannister to install a locking mechanism, and the sharp drop in dose rate near the ends of the chamber it was decided that the use of an 18 inch long volume centered in the chamber would be best suited to the program. Therefore, additional data was obtained concentrating on the lowest and highest areas. Samples were taped to the inside edge of the 4 7/8" dia. holder (which was constructed of the same material that will be used to make the cannisters). This moves the samples approximately 3/8" closer to the cannister wall than the 2" radius data. These data are presented on Data Sheet #4. A comparison of these points on Data Sheet #4 to the same points on Data Sheet #1 shows how the dose rate increases at points adjacent to the sources and decreases at points midway between sources. From this one can estimate the increase and decrease in dose rate that will occur in the 1/2" area on out to the cannister wall that cannot be measured because of the dosimeter size. It would appear that an estimate of a 5 percent change should cover this.

Data Sheet #5 shows the effects of the holder fitted with ends approximating that which the normally used cannister will have and loaded with pupae. The samples were taped to the holder inside wall at the points shown. The top set of data on Data Sheet #6 shows the effect of pupae on the delivered dose at pertinent points on the central axis of the chamber. Obviously the lowest points occur at the front of the cannister in the between source areas. The pupae absorption data was repeated; therefore, the data presented are averages. The actual low point found was 3150 Rads/min and the high point was 4950 Rads/min. These values are converted to R/min by dividing by 0.97 to give a low point of 3250 R/min and a high point of 5100 R/min.

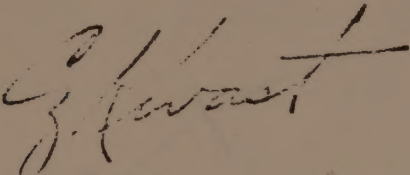
The value of 3250 R/min should be used to determine the initial irradiation time for the unit. Remembering that this value was obtained inside a typical cannister loaded with pupae, that an estimated 5 percent decrease in dose will occur in those areas that could not be measured, and that the estimated accuracy of the dosimetry system is ± 5 percent, program officials should decide how much of a safety factor should be added to assure sterilization. Our own thought on this is that 20 percent should be more than adequate. Therefore, if 20 percent is used then the initial irradiation time will be 6000 R (5000 R minimum dose required plus 20 percent) divided by 3250 to give a time of 1.85 minutes. The high dose delivered at this irradiation time would approximate 9450 R.

The cannister used should be no greater than 4 7/8" o.d. and should have a pupae containing volume not to exceed 18 inches which must be centered in the irradiation chamber. Additionally, since the rear end of the chamber has a slightly higher dose rate the latch mechanism of the cannister should always be positioned to the rear. The bioassay should concentrate on the two ends, particularly out at the edges, and at the center cross section.

We believe the bioassay should be very thorough, perhaps 2 or 3 steps above and below the recommended time at increments not to exceed 10 percent. We would appreciate receiving a copy of the bioassay results.

We are particularly appreciative of Dr. Grabbe's and Mr. Blackwelder's assistance in performing this calibration. Mr. Blackwelder's assistance was especially appreciated since he worked about 11 hours on Saturday, May 19 to help get the unit set up and operating.

If you should have any questions or if we may be of help in interpreting this data please contact us.



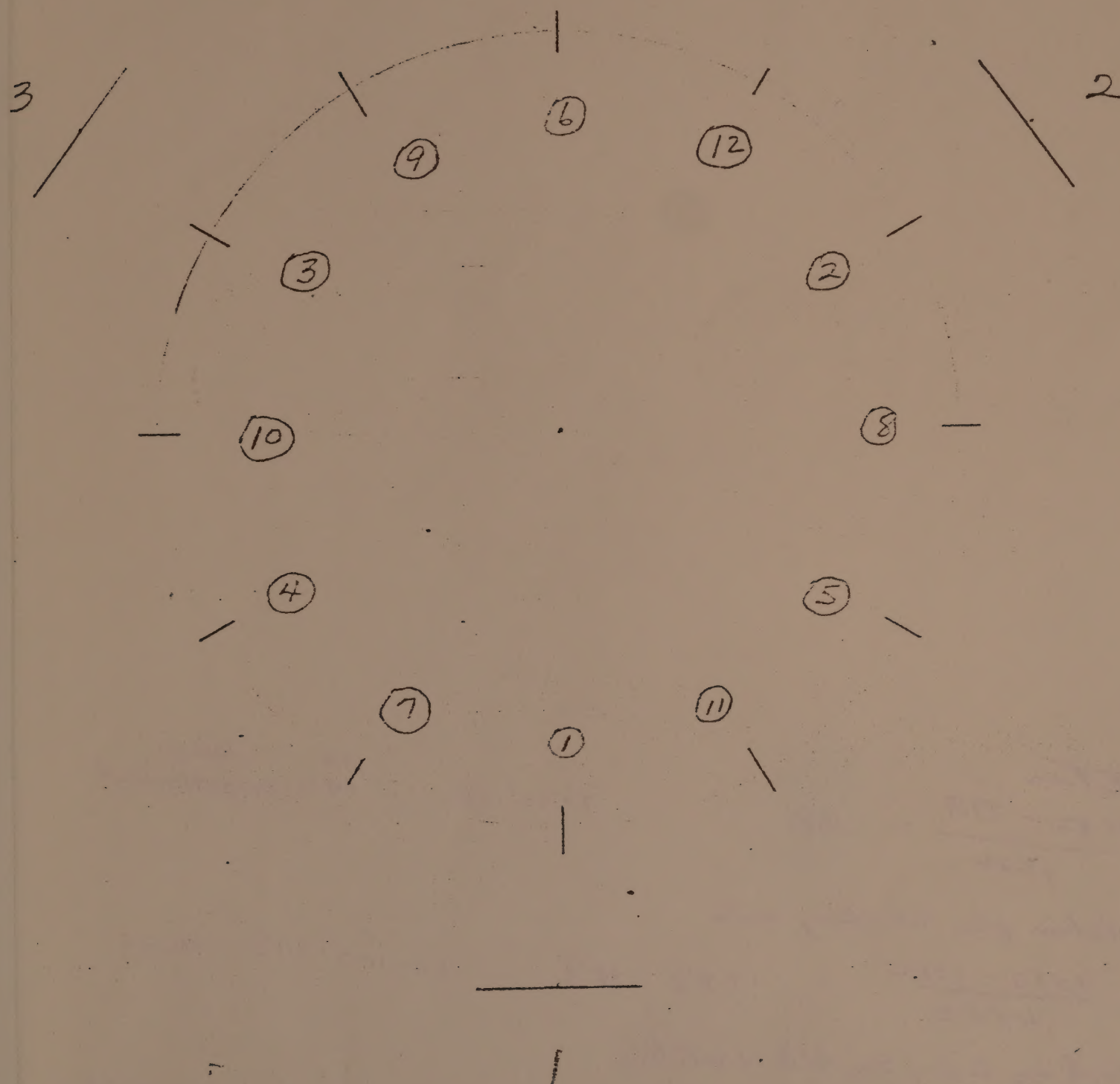
C. Z. Kwast
Radiological Safety Officer

cc:

V. Blackwelder, with/encls. ✓
D. Williams, with/encls.
C. Husman, with/encls.
N. L. Meyer, with/encls.

Sample Identification Chart

Sample and Source Numbering as viewed
from Front of Unit



Rotation

$$\frac{4582 - 3719}{4582} = 18.8\%$$

$$32\% - 18.8\% = 13.2\% \text{ change}$$

~~14% improvement~~

Rotation plus blocking ends

$$\frac{4582 - 3762}{4582} = 17.9\% = 18\%$$

$$32 - 18 = 14\% \text{ change}$$

Blocking Ends, middle + rotation

$$\frac{4582 - 4082}{4582} = 10.9\% \text{ rotation}$$

$$32 - 10.9 = 21.1\% \text{ change}$$

SUMMARY DATA SHEET #1 - NORMAN INDIAN MOUND

VALUES IN RADS/MIN by FRICKE CHEMICAL

ALL SAMPLES LOCATED ON 2" RADIUS FROM CENTER

		①	⑪	⑤	⑧	②	⑫	⑥	⑨	③	⑩	④	⑦	REAR
3890 ave. 1	3893	3891	3824	3732	4938	4141	4040	4009	4141	3169	3638	3715		12%
4180 2	4180		3963		4505		4234		4451		3855			14%
3	4396	4394	4218		4783	4721	4505	4059	4690	4195	4110	4164		14%
4546 4	4451		4234		4822		4590		4807		4079			15%
4505 5	4427	4396	4234	4334	4838	4845	4605	4783	4791	4683	4164	4218		14%
4373 6	4226		4195		4629		4489		4667		4079			13%
7	4040	4064	4009	4087	4474	4389	4458	4451	4505	4195	4025	4064		11%
8	3885		3870		4040		4064		4187		3855			8%
9	3816	3731	3731	3731	3916	3885	3924	4009	4040	3885	3777	3831		8%
3762 ave. 10	3769		3578		3878		3855		3947		3731			9%
11	3986	3855	3855	3816	4064	3947	4009	3986	4087	3870	3855	3932		7%
12	4141		3978		4319		4102		4319		3932			9%
13	4358	4195	4195	4195	4652	4474	4505	4427	4551	4218	4141	4242		11%
4500 14	4435		4033		4706		4505		4768		4187			15%
ave. 15	4543	4373	4358	4567	4969	4768	4598	4798	4822	4358	4195	4373		16%
4446 16	4396		4203		4760		4567		4791		4102			14%
17	4242	4234	4079	4216	5780	4629	4373	4605	4667	4218	4009	4187		14%
18	3885		3754		4195		4079		4427		5736			16%
4082 19	3586	3568	3452	3731	3878	3877	3793	3885	4071	3715	3444	3367		17%
3719 ave.														

21% 19% 21% 18% 20% 20% 18% 19% 18% 21% 18% 23%

Discard
 $4969 - 3367 = 1602$

$\frac{1602}{4969} = 32\%$

Blocking Ends. (point 1 + 19)
 $4969 - 3578$ (28% variation)

Blocking Ends + Point 10
 $4969 - 3731$ (25% variation)

SUMMARY DATA SHEET #2 - Husman Irradiator - May - 1973

Value in Rads/min by Fricke Chemical

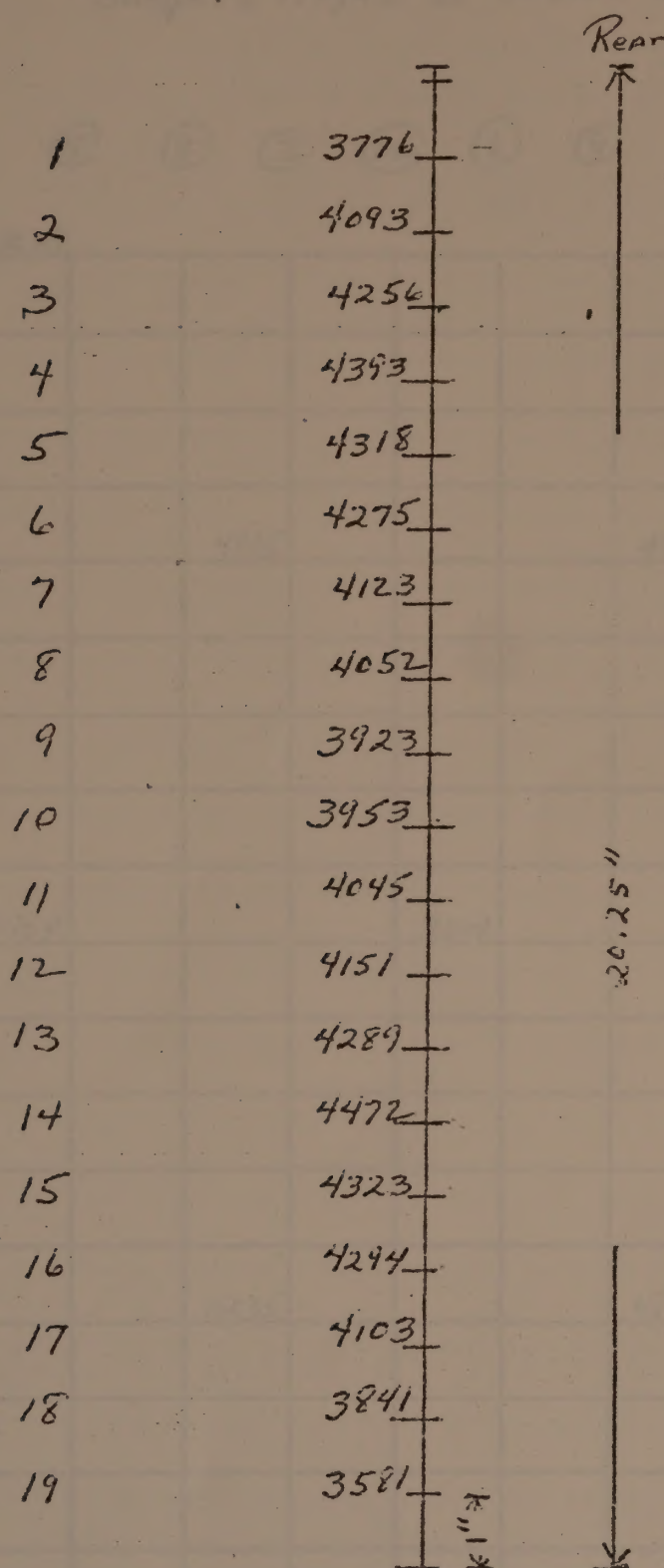
ALL Samples Located on 1" radius from Center

	(1)	(11)	(5)	(8)	(2)	(12)	(6)	(9)	(3)	(10)	(14)	(7)	Feet
1		3847				3932					3808		20.25"
2													
3		4272				4466					4164		
4													
5		4342				4505					4319		
6													
7		4141				4242					3986		
8													
9		3947				4040					4009		
10													
11		4002				4064					4141		
12													
13		4257				4352					4195		
14													
15		4350				4451					4296		
16													
17		4141				4296					4079		
18													
19		3545				3700					3560		

SUMMARY DATA SHEET # 3 - NORMAN IRRADIATION - MAY-1973

Values in Rads/min by Fricke Chemical

ALL SAMPLES LOCATED AT CENTRAL AXIS



Samples Taped To Inside Wall of Holder ($4\frac{1}{8}$ " dia)

(11) ~~(4)~~ (5) (8) (2) (12) (6) (9) (3) (10) (4) (7)

3630 3739

Ren-

" --- 4616
Center

center - 7 -

--- 4718
Printer

3654

3564 3363

3435 | 3371

18"
Centered in Chamber

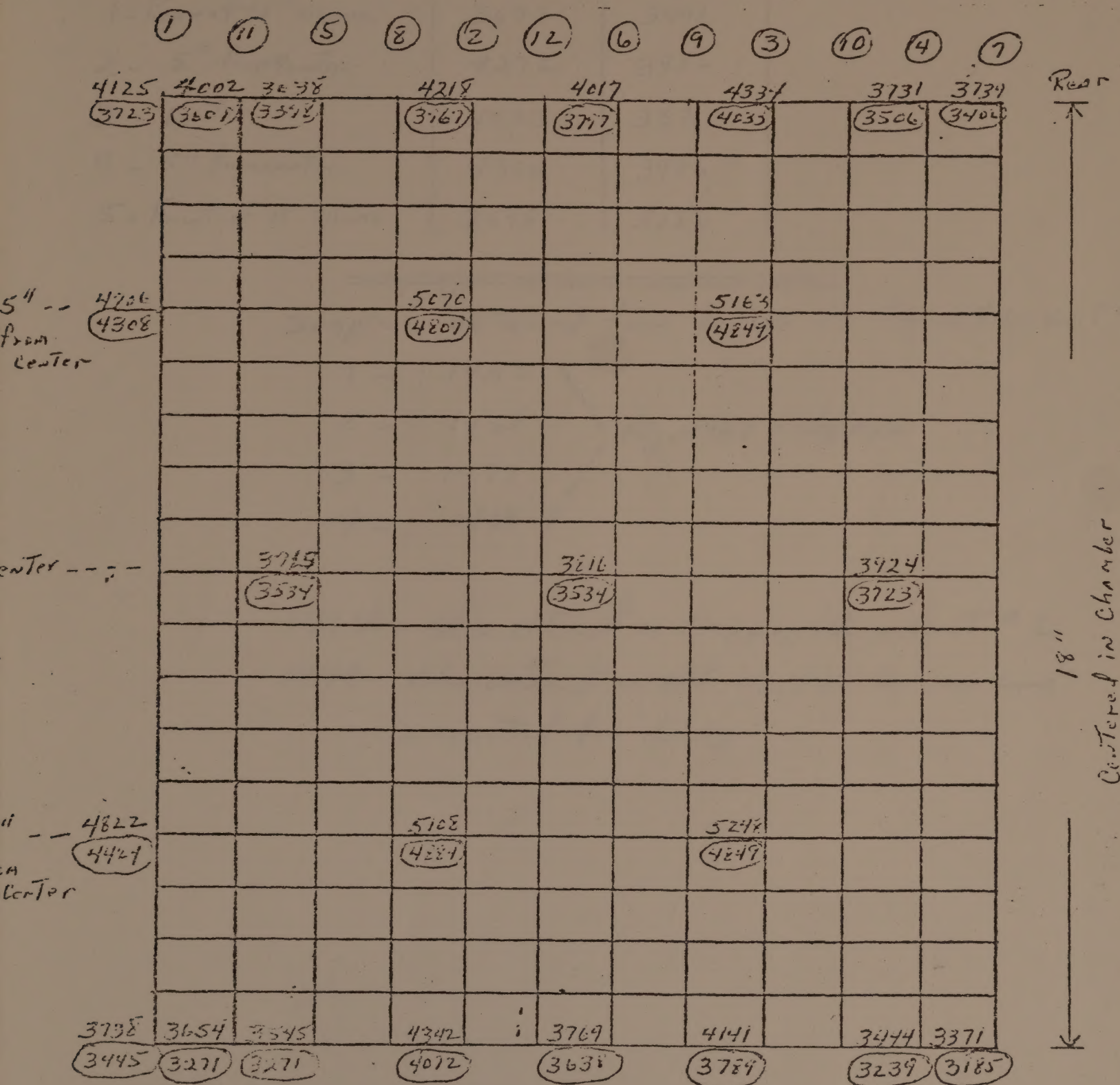
Summary DATA Sheet # 5 - NORMAN IRRADIATOR - MAY - 1973

VALUES in Rads/min by FRICKE Chemical

SAMPLES Taped To Inside WALL of Holder (4 7/8" dia)

Ends in place - No pupae

Circled values - with holder Loaded with pupae



Summary DATA Sheet # 6 - Human Irradiation - May-1973
 Values in Rads/Min by Fricke Chemical

Sample ALL located on Central Axis

Sample Location	No Popac	Popac
1 - Rear of 18" Volume	3677	3491
2 - 5" front center	4272	3986
3 - Center	4033	3371
4 - 5" front center	4334	3986
5 - Front of 18" Volume	3545	3286

Samples obtained from Center of Cobalt-60 Unit # 2

1 - 1450	} Avg. 1464 Rads/Min
2 - 1458	
3 - 1477	
4 - 1469	

1464 - Value obtained on May 24, 1973 in Unit # 2

1479 - Value obtained on Oct 29, 1968 in same unit
 Corrected for decay

✓ EAT *EAT*
✓ WFS *WFS*
— JE *JE*
— NC

February 5, 1975

Subject: Transmittal of Program of Research on Screwworms
at the MRRL, Fargo

To: Waldemar Klassen, Staff Scientist
National Program Staff, ARS, USDA
BARC-West, North Building
Beltsville, Maryland 20705

I am pleased to transmit the enclosed document, and I am sure that you will agree that Gerald Holt is to be complimented for putting together a well prepared, lucid program of research on the screwworm here at Fargo.

As you know, back in November we requested a new WRU be established to cover the screwworm research at MRRL. At that time we indicated that the work would be initiated by redirecting \$37,920 from lower priority research. The program envisaged in this brochure is much more extensive and will require additional funds if it is to be pursued vigorously. Only some exploratory work can be done with existing funds.

The expertise of our scientists at MRRL is admirably suited for the projected research. Many of the experimental techniques have been perfected on other insects and with only slight modifications can be used to study the biology of the screwworm. You will also note that four other collaborators from other ARS laboratories have expressed a willingness to cooperate with us on some of the research studies. MRRL has provided some input to the screwworm program for over ten years. Now we are in a position to make a major contribution to the biology of this important livestock pest and thus provide substantial information for the APHIS eradication program.

Claude H. Schmidt
Claude H. Schmidt, Director
Dakotas-Alaska Area

Enclosure

cc: A. Cooper
E. Glover
✓ E. Taylor

RECEIVED

FEB 10 1975

AREA OFFICE
WESLACO, TEXAS

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
METABOLISM AND RADIATION RESEARCH LABORATORY
STATE UNIVERSITY STATION
FARGO, NORTH DAKOTA 58102

February 4, 1975

Subject: Program of Research on Cochliomyia hominivorax at the
Metabolism and Radiation Research Laboratory, Fargo, ND

To: Waldemar Klassen, Staff Scientist, Pest Management, NPS,
ARS, USDA, ARC-W, North Bldg., Beltsville, Md. 20705

Through: C. H. Schmidt, Director, Dakotas-Alaska Area *CHS*
Edward J. Thacker, Director, MRRL
L. E. LaChance, Research Leader, Radiation Biology and
Insect Genetics, MRRL
D. R. Nelson, Research Leader, Insect Metabolism and
Physiology, MRRL

Enclosed is the material you requested in our telephone conversation
of January 20.

If you have any questions or suggestions, please call me.

Since our original intentions were to submit a report in May (with
preliminary results), there may be areas that lack continuity or
clarity in this report.

Gerald G. Holt
Research Biologist

Encl.

DRAFT

Telex via teleprinter
8-4-75 11:15 AM
To: Donald Williams, Rm 732
From: H.C. Cox

QE

Subject: Evaluation of Screwworm Eradication
Data System

To: F. J. Mulhern, Administrator, APHIS

This is in further reference to our earlier correspondence regarding the above subject. Several members of our staffs met on July 31 in order to discuss research required to determine applicability of the NASA Screwworm Eradication Data System (SEDS) to screwworm eradication operations. Participants from APHIS were Drs. Donald Williams (Hyattsville) and Floyd Smith (Mexico City). ARS participants were Drs. Robert Miller (Washington), Wendell Snow (Mission) and H.C. Cox (New Orleans). It is my understanding that NASA believes its system to be currently operational, has indicated that funding for development will terminate at the end of FY76, and has proposed that APHIS take over the system after FY76.

NASA has been making data from the system available for the past few months. Our scientists have reviewed only a limited amount of data from the system but, on the basis of their preliminary analysis, they have doubts about its applicability to an operational eradication program. Not only have they been unable to correlate screwworm occurrence with predictions from the system, but other factors make it appear that the system has not been completely "de-bugged". These factors range from less important (for example, variations in the color codes of predictions of conditions conducive to screwworm growth) to extremely important (for example, no reports due to long periods of cloud cover in southern Mexico).

We do not feel that ARS scientists will be able to accurately evaluate the predictive capability of SEDS until NASA has the system operationally ready. At that time we believe we should evaluate the system over an entire year, that is four full seasons. We realize that NASA has budgeted their work on SEDS only through this fiscal year. However, if the system is to be seriously considered for operational use it would be unfair to NASA and SEDS to make an evaluation before they are completely satisfied that the system has all the bugs worked out. (Reviewers: is there a better phrase to use here?) Therefore, we would hope that NASA would be encouraged to continue the project through FY77. Specifically this would allow them time to perfect the system and then allow us time to adequately evaluate it.

In the meantime, our Mission laboratory will continue to make preliminary (Reviewers: is there a better word?) evaluations on the predictive capacity of SEDS by using data on known screwworm cases supplied by your Mission facility. While most of the data will probably be from south Texas, we will also consider such data from Mexico as is available from reports made to Hyattsville.

NASA has scheduled a technical review of SEDS and their proposed participation in the joint Mexican-American Program in Houston on August 19-20. Dr. James Novy (APHIS), Drs. Marco Villasenor and Norvan Meyer (Joint Commission), and Drs. Wendell Snow and Robert Miller (ARS) have been invited to attend.

The meeting will undoubtedly include discussion of NASA's Phase II Project Plan, Screwworm Eradication Data System (SEDS) Field Tests. The document proposes field tests in Mexico as a joint effort among NASA, USDA, the Secretaria de Agricultura, SAG, and the Comision Nacional del Espacio Exterior (CONEE). The proposal indicates that SEDS has been operational since mid-March 1975, producing data with sufficient accuracy to be useful in monitoring screwworm growth but that it must be field tested and evaluated before it is used operationally. We will, of course, be glad to work with NASA to the extent possible with current resources in order to assist them in modifying and improving their system over time.

While we have doubts about a simplistic system involving only temperature and moisture, we feel that the concept of a predictive system is good and could be useful to an operational screwworm eradication program. However, such a system should include a number of other variables such as types of vegetation and stages of growth, wild life in the area, ranching operations such as shearing, lambing, dehorning and branding, and so forth. In the event that the evaluation of SEDS indicates that it is not adequate for operational use, we will be interested in learning the extent of your interest in our undertaking research to develop such a system. We would have to consider such a research program within the limits of our current resources; however, we would not want to redirect current research on attractants, biology and ecology, and nutrition and rearing unless you feel such changes would be desirable.

Screwworm Research Laboratory
P. O. Box 986
Mission, Texas . 78572

EAT *EAT*
WES *WES*
JE *JE*
NC

October 17, 1975

Subject: Isoenzymes

To: Edward J. Thacker, Laboratory Director
Metabolism & Radiation Research Laboratory
P. O. Box 5674
State University Station
Fargo, North Dakota 58102

Dr. Nelson recently requested that we supply Fargo with frozen screwworm adults from our strains to determine isoenzyme patterns. Some of this work has apparently been done at Fargo with the PF8 strain and is planned for the 009 strain. Currently, Mission is involved in a cooperative agreement with the University of Texas for this purpose, and this agreement will probably be expanded through a NSF grant. We helped with the proposal and have agreed to continue in a cooperative relationship when it is funded. Dr. C. J. Whitten, of our staff, is actively involved in this area and handles the agreement.

This has turned out to be a productive arrangement and covers needs in the area. I fear that Fargo involvement, without discussion with the principals, will jeopardize the relationship in that we will become a middle man between near duplicate research. Dr. Nelson says we should not be concerned because Dr. Terranova will probably not make a contribution because of a requested transfer.

For these reasons, I request that your laboratory not become involved unless the work is to be completed and coordinated with Drs. Whitten and Bush in such a way to be useful and not jeopardize our other cooperative efforts.

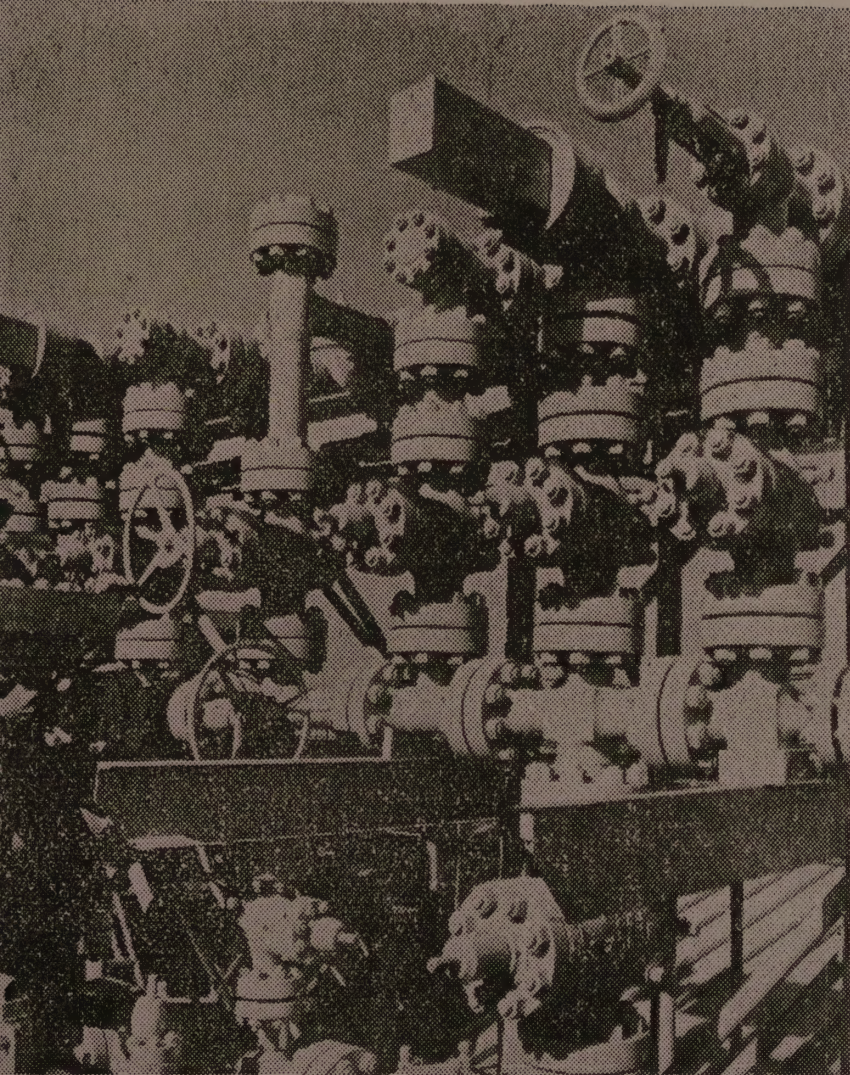
J. Wendell Snow
J. Wendell Snow
Research Leader

cc Dr. Lindquist
Dr. Cox
→ Mr. Taylor
Dr. Whitten

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OCT 20 1975

AREA OFFICE
WESLACO, TEXAS



NG complex of pipes and valves, called a choke and kill manifold, around a workman of an offshore oil rig. Built by McEvoy Oilfield Co., an affiliate of Rockwell International, the device is used to destructive blowouts.

Assault on screwworm seen starting in Mexico

By
BILL CUNNINGHAM
AGRICULTURE EDITOR

A new assault on the screwworm may be started before 1976 at a new plant at Tuxtla Gutierrez in Mexico.

Larry Burrer, a native of Fredericksburg, will be in charge of the production of sterile flies in the new plant under construction.

There were fears a few weeks ago that an earthquake had damaged some of the construction, but Burrer said the damage was slight.

Tuxtla Gutierrez is about halfway across the 120-mile wide Isthmus of Tehuantepec.

Construction is a joint effort of the United States and Mexico. Bill Sudlow will be the program director for the entire plant.

The new plant's 300 million sterile flies per week will be a tremendous boost to the eradication of the pests which has cost cattle-

men in both nations billions of dollars.

Production of sterile flies started at the plant at Mission in 1962 and production has increased from 75 million to 200 million flies per week.

Screwworms mate once in their lifetimes and the sterile flies break up the cycles. With both plants supplying flies in the critical spots, officials feel the fly will be doomed.

The plant at Tuxtla Gutierrez eventually may be the only one in operation, but Burrer said the plant at Mission will not be closed at once.

He and some other key personnel in the project were at Mission for special training last month.

Hydroponics

Larvae will be fed on a hydroponic diet at the Tuxtla Gutierrez plant, Burrer said.

The diet will be made up

of dried blood, dried milk, dried egg and dry cottage cheese.

It will be possible to maintain a six-months' supply of the diet material in warehouses there, he said. This would not be possible if the diet consisted of meat.

Burrer praised the people of Tuxtla Gutierrez for their friendly nature.

"If they can't understand me, they give me a pencil to draw a picture," he remarked.

Tuxtla Gutierrez is in a valley and has an elevation of about 1,700 feet. It is surrounded by high mountains.

Value of the overall project has been proved through the years, and officials of the plant at Mission estimate that the program has saved cattlemen about \$10 billion since its opening.

CATTLE CLATTER

One of the big fall cattle sales in this area will be the Chaparrosa Cowman's Choice Auction Nov. 24 at the ranch eight miles west of La Pryor.

The sale will start at 12:30 p.m., according to Kelton K. Johnson, owner of the Chaparrosa.

He said the 100 bulls to be offered will be the largest number of purebred Santa Gertrudis bulls ever sold in one production sale by one breeder. Also to be sold are 100 bred Santa Gertrudis heifers and 150 bred three-year-old commercial cows.

Marketplace

GMC TRUCKS
4 Wheel Drive, Short & Long Wheel Base, Vanduras & Suburbans

Tindall & Son
Pontiac, GMC

Kroger
rents

✓ EAT *[initials]*
✓ WFS *[initials]*
— JE *[initials]*
— NC —

Subtropical Texas Area
P. O. Box 986
Missiog, Texas 78572

November 18, 1975

P. L. Adkisson
Entomology Department
Texas A&M University
College Station, Texas 77843

Dear Perry:

We have approached the Civil Service Commission for a research entomologist with a strong background in insect physiology. Apparently DR. F. S. Guillot has been certified for the position and will join the federal staff in a few weeks. This change will leave us without a cooperative Texas A&M Scientist.

Recently Dr. Alberto Brocie indicated a desire to work at Mission in the area covered by our agreement. He is a citizen of Panama but has an American wife and three children. He has applied for citizenship but in the mean time holds a permanent Immigration Card Number A-34570120. His PhD was obtained in Florida under Phil Callahan at our attractants laboratoy. He speaks spanish and his last two years have been totally involved with ecological studies of the screwworm. He is the only scientist I know that meets our needs of screwworm experience, spanish, and a strong ecological back ground.

I request that he be placed on the cooperative agreement beginning December 15, 1975. In addition, I suggest a salary of \$19,000/year to be commensurate with federal employees.

If additional information is needed please let me know.

Thanks for all,

J. Wendell Snow
J. Wendell Snow
Location Leader

cc: E. A. Taylor, Area Director ✓

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NOV 18 1975

AREA OFFICE
WESLACO, TEXAS

TEXAS A&M UNIVERSITY
COLLEGE OF AGRICULTURE
DEPARTMENT OF ENTOMOLOGY
COLLEGE STATION, TEXAS 77843



Eds *WHS*

Instruction-Research-Extension

Phone 845-2516

November 24, 1975

Dr. J. Wendell Snow
Location Leader
USDA-ARS, Southern Region
Subtropical Texas Area
P. O. Box 986
Mission, Texas 78572

Dear Dr. Snow:

There does not appear to be any reason why we cannot hire Dr. Alberto Brocie if he is the best qualified person for the position you have open in the Screwworm Fly Laboratory. We will have to file a job announcement with our Personnel Officer and make an advertisement through the Entomological Society of America. If Dr. Brocie is selected I will have to obtain clearance through our International Student Officer.

A position announcement form is enclosed. Please complete and return to me so I can fill a job vacancy announcement and place a position open notice with E&A.

Sincerely,

P. L. Adkisson
P. L. Adkisson
Professor and Head

FLA:pkd

cc: Director J. E. Miller
Mr. E. A. Taylor ✓

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NOV 28 1975

AREA OFFICE
WESLACO, TEXAS

C
O
P
Y



TEXAS A&M UNIVERSITY
COLLEGE OF AGRICULTURE
DEPARTMENT OF ENTOMOLOGY
COLLEGE STATION, TEXAS 77843

Phone 845-5216

Instruction-Research-Extension

November 24, 1975

Dr. J. Wendell Snow
Location Leader
USDA-ARS, Southern Region
Subtropical Texas Area
P. O. Box 986
Mission, Texas 78572

Dear Dr. Snow:

There does not appear to be any reason why we cannot hire Dr. Alberto Brocie if he is the best qualified person for the position you have open in the Southwest Fly Laboratory. We will have to file a job announcement with our Personnel Officer and make an advertisement through the Entomological Society of America. If Dr. Brocie is selected I will have to obtain clearance through our International Student Officer.

A position announcement form is enclosed. Please complete and return to me so I can fill a job vacancy announcement and place a position open notice with ESA.

Sincerely,

P. L. Addison
Professor and Head

FLA:phd

cc: Director J. E. Miller
Mr. E. A. Taylor

RECEIVED

NOV 29 1975

AREA OFFICE
WESTLAC, TEXAS